Matrix PureSine®

Active Filter
480 Volts, 60HZ

USER MANUAL

PART NO. INSTR –028

REL. 111111

Rev. 007

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IMPORTANT USER INFORMATION

NOTICE

The MTE Corporation Matrix PureSine® Active Harmonic Filter is a powerful filtering solution for coordinated variable load power factor correction (PFC), phase imbalance correction, and harmonic mitigation. The suitability of this filter for a specific application must therefore be determined by the customer. In no event will MTE Corporation assume responsibility or liability for any direct or consequential damages resulting from the use or application of this filter. Nor will MTE Corporation assume patent liability with respect to the use of information, circuits or equipment described in this instruction manual. The purpose of this manual is to introduce the operating principle of the Matrix PureSine Active Harmonic Filter and provide safe operating instructions.
In case any error message occurs, most of them can be identified and troubleshot through this manual. In case any error message occurs, which does appear in this manual, you have to contact with local authorized service agent for troubleshooting and repair.

All the installation, operation, maintenance of this device shall be done by authorized and qualified technician who is familiar with this manual.

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[1]Note: Consult factory regarding Rack Mount filters

IMPORTANT SAFETY INFORMATION

WARNING

ONLY A QUALIFIED ELECTRICIAN CAN CARRY OUT THE ELECTRICAL INSTALLATION, CALIBRATION, AND MAINTENANCE OF THIS FILTER

WARNING

High voltage is used in the operation of this filter. Use Extreme caution to avoid contact with high voltage when operating, installing or repairing this filter. Proper grounding should be double verified before the filter is started up. Improper grounding might cause abnormal operation and risk of electrical shock might occur.

INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components.

WARNING

The opening of the branch circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electrical shock, current-carrying parts and other components of the filter should be examined and replaced if damaged.

IMPORTANT SAFETY INFORMATION, CONT.

WARNING

An upstream disconnect/protection device must be used as required by the National Electrical Code (NEC) or governing authority.

WARNING

Even if the upstream disconnect/protection device is open, the drive down stream of the filter may feed back high voltage to the filter. The drive safety instructions must be followed.

INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED

WARNING

The filter must be grounded with a grounding conductor connected to all grounding terminals.

WARNING

Only spare parts obtained from MTE Corporation or an authorized MTE distributor can be used.

WARNING

Any incorrect or improper installation of the filter might increase harmonic current and voltage, which might damage power system or load connected.

Introduction

This manual was specifically developed to assist in the installation, interconnection and operation of the MTE Corporation Matrix PureSine Filter.

This manual is intended for use by personnel experienced in the operation and maintenance of electronic drives. Because of the high voltages required by the filter and drive and the potential dangers presented by rotating machinery, it is essential that all personnel involved in the operation and maintenance of this filter know and practice the necessary safety precautions for this type of equipment. Personnel should read and understand the instructions contained in this manual before installing, operating or servicing the filter and the system to which the filter is connected.

Upon Receipt of this Filter:

The MTE Matrix PureSine Filter has been subjected to demanding factory tests before shipment. Carefully inspect the shipping boxes for damage that may have occurred in transit. Then unpack the filter and carefully inspect for any signs of damage. Save the shipping box for future transport of the filter.

In the event of damage, please contact and file a claim with the freight carrier involved immediately.

If the equipment is not going to be put into service upon receipt, cover and store the filter in a clean, dry location. After storage, ensure that the equipment is dry and that no condensation has accumulated on the internal components of the filter before applying power.

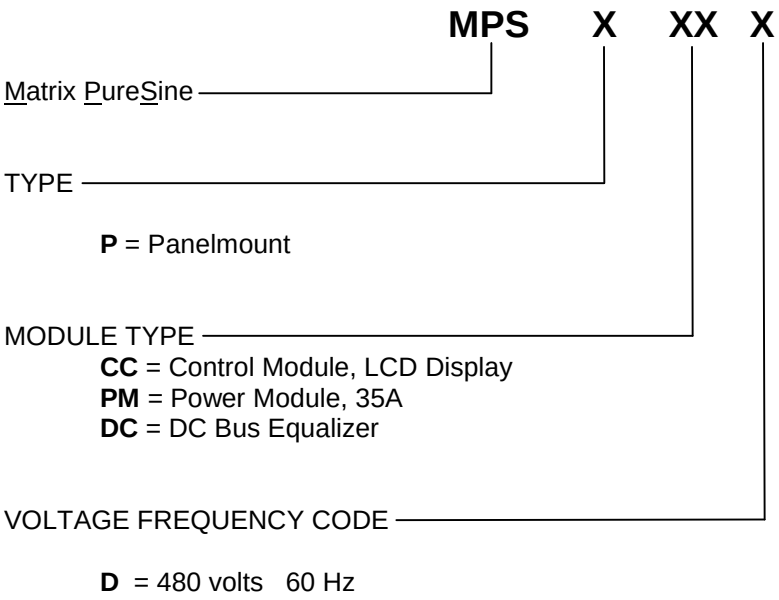
Repair/Exchange Procedure

MTE Corporation requires a Returned Material Authorization Number before it can accept any filters that qualify for return or repair. If problems or questions arise during installation, setup, or operation of the filter, please call the Director of Corporate Quality for assistance at:

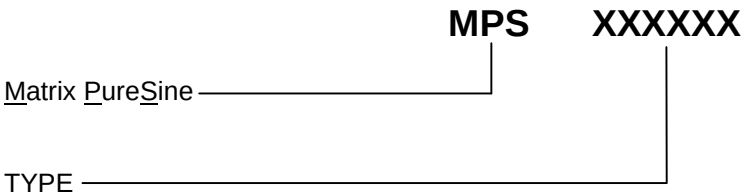
Phone: 262-946-2800

FAX: 262-253-8222

PART NUMBER CODES



ACCESSORY PART NUMBER CODES



CT500 = Current Transducer, CT500/1A, Closed, 5VA
CT1000 = Current Transducer, CT1000/1A, Closed, 10VA
CT2000 = Current Transducer, CT2000/1A, Closed, 20VA
CTBD = Auxiliary CT Board, 5A/1A
COMM2 = Communication Interface-2, RS485+RS422 Port
COMM3 = Communication Interfact-3, Ethernet (RJ45) Port
WMK = Wall Mount Kit (Needed if more than (2) Power Modules Installed)

SOFT SineSync Monitoring Software

1. The Functional Features of the *Matrix* PureSine

Functional Features

The Matrix PureSine is a solid-state power converter, which offers the following features:

- Eliminates the harmonic current generated by non-linear loads.
- Compensates reactive power for lagging or leading loads.
- Act as a virtual damping resistor to prevent possible harmonic resonance.

The Matrix PureSine is a harmonic current generator that creates an opposite phase-shifted harmonics current of the same amplitude.

The benefits for the improvements of harmonic currents:

(1) No risk of harmonic resonance.
(2) Reduce voltage waveform distortion
(3) Reduce voltage drops on transformers and cables.
(4) Reduce heating of the transformers and cables.
(5) Improved power factor

The Matrix PureSine is not recommended to use with a load that has a very fast current rise time. Such a load, like that of a rectifier employing phase control with very low inductance, may cause the **Matrix PureSine** to stop operating. When the **Matrix PureSine** is applied in such a load, we recommend installing a 3%~5% reactor at the input side of the load to reduce the rising rate of load input current.

In certain applications where there is equipment having similar characteristics, such as load which generate high-frequency current, power factor correction capacitors, certain types of passive harmonic filters, etc., may also affect the normal operation of the **Matrix PureSine** or causing it to shut down.

Major Components

Matrix PureSine is a modular Active Filter designed and is composed of Control Modules, DC Equalizer Modules, and Power Modules.

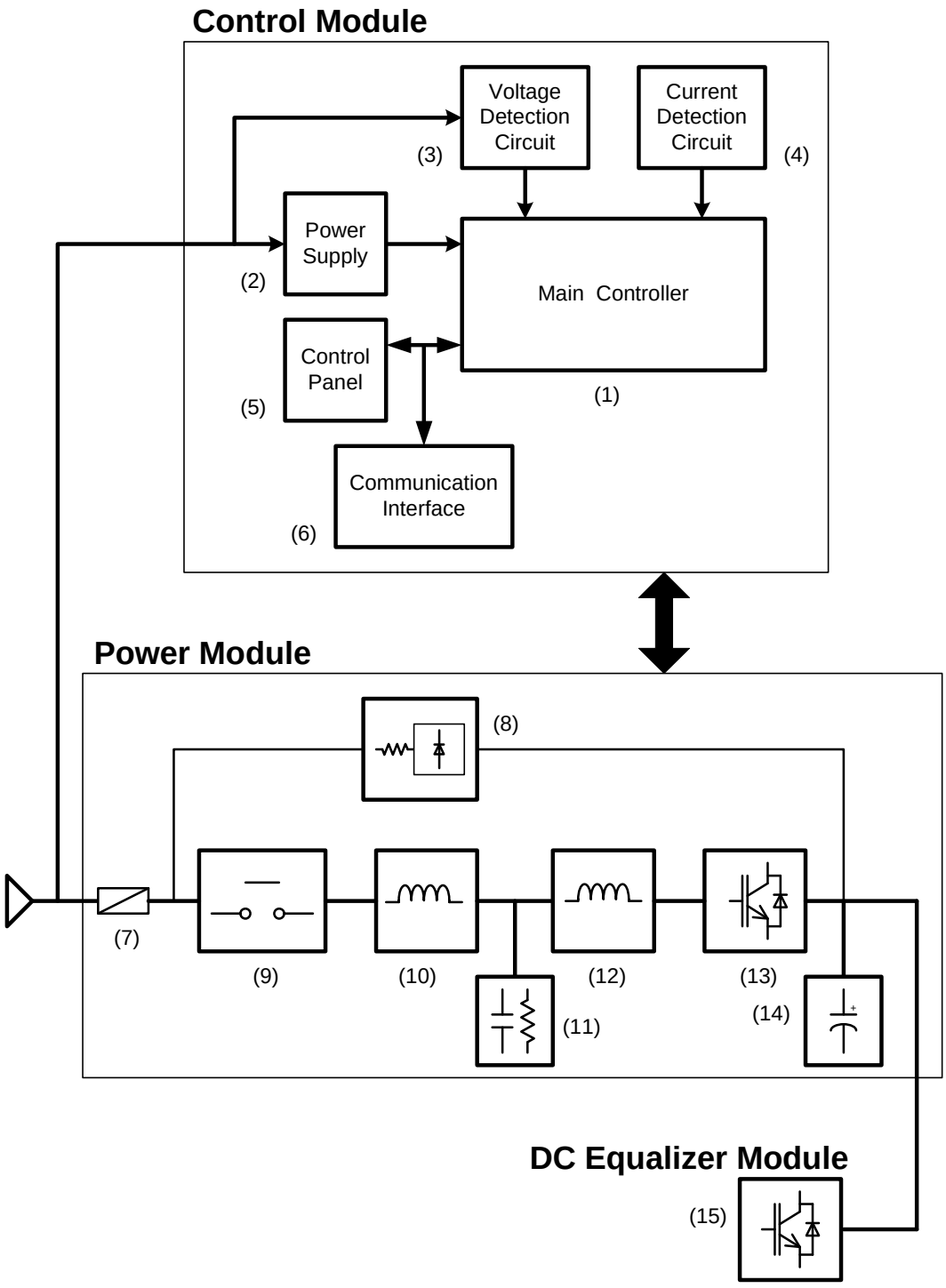


Fig. 1-1 Matrix PureSine Bock Diagram

Control Module contains the following:

(1) **Main Controller**

The control core of the PureSine, controls the operation of Power Module.

(2) **Power Supply**

Provides DC power for the Control Module.

(3) **Voltage Detection Circuit**

Provides the three phase AC main voltage signal for the controller.

(4) **Current Detection Circuit**

Provide the Source or Load side current signal for the controller to calculate harmonic and reactive current.

(5) **Control Panel**

Operates the ***PureSine*** and displays the status of operation.

(6) **Communication Interface**

Provides the ability to add, up to two, optional communication interfaces.

Power Module contains the following:

(7) **Main Fuse**

Prevents damage from over-current.

(8) **Soft-start Module**

The primary function of this module is to pre-charge the DC Capacitor Module to reduce inrush current while the PureSine starts-up. When the voltage of the DC Capacitor Module reaches a certain level, the PureSine can be started and harmonic current compensation can begin.

Major components are:

a. Current-limit resistor

b. Rectifier

(9) **Electromagnetic Contactor Module**

The Electromagnetic Contact Module is a switch that links the IGBT power converter and the power system. When the PureSine is off, the contactor will be open to isolate the IGBT power converter from the power system. When

the PureSine is on, the contactor is closed to link the power converter and the power system.

(10) **Link Inductor Module**

The link inductor is a power transmission interface between the IGBT power converter and the power system.

(11) **Ripple Current Filter Module**

The ripple current filter is shunt-connected passive filter. The primary function is to absorb high-frequency ripple current from IGBT power converter.

Major components are:

a. Parallel/Series link resonance filter.

b. Over-current Protection Fuse.

(12) **High Frequency Inductor**

The primary function is to filter the high-frequency ripple current from IGBT power converter.

(13) **IGBT Power Converter Module**

The primary function of the IGBT Power Converter Module is to convert the energy provided by the power system to harmonic and reactive power compensated current, to reduce harmonic current and improve the power factor.

It is composed of the major components as below:

a. IGBTs Bridge

b. Driver Circuit

c. Snubbers

(14) **DC Capacitor Module**

The DC Capacitor Module is made up of a specific numbers of similar rating DC capacitors connected electrically in parallel/series. The DC Capacitor Module stores the energy and maintains a constant DC voltage, which is controlled by the IGBT power converter.

(15) **DC Equalizer Module**

The function of this module is to balance the DC capacitor voltage within the power module.

System Schematic Diagram

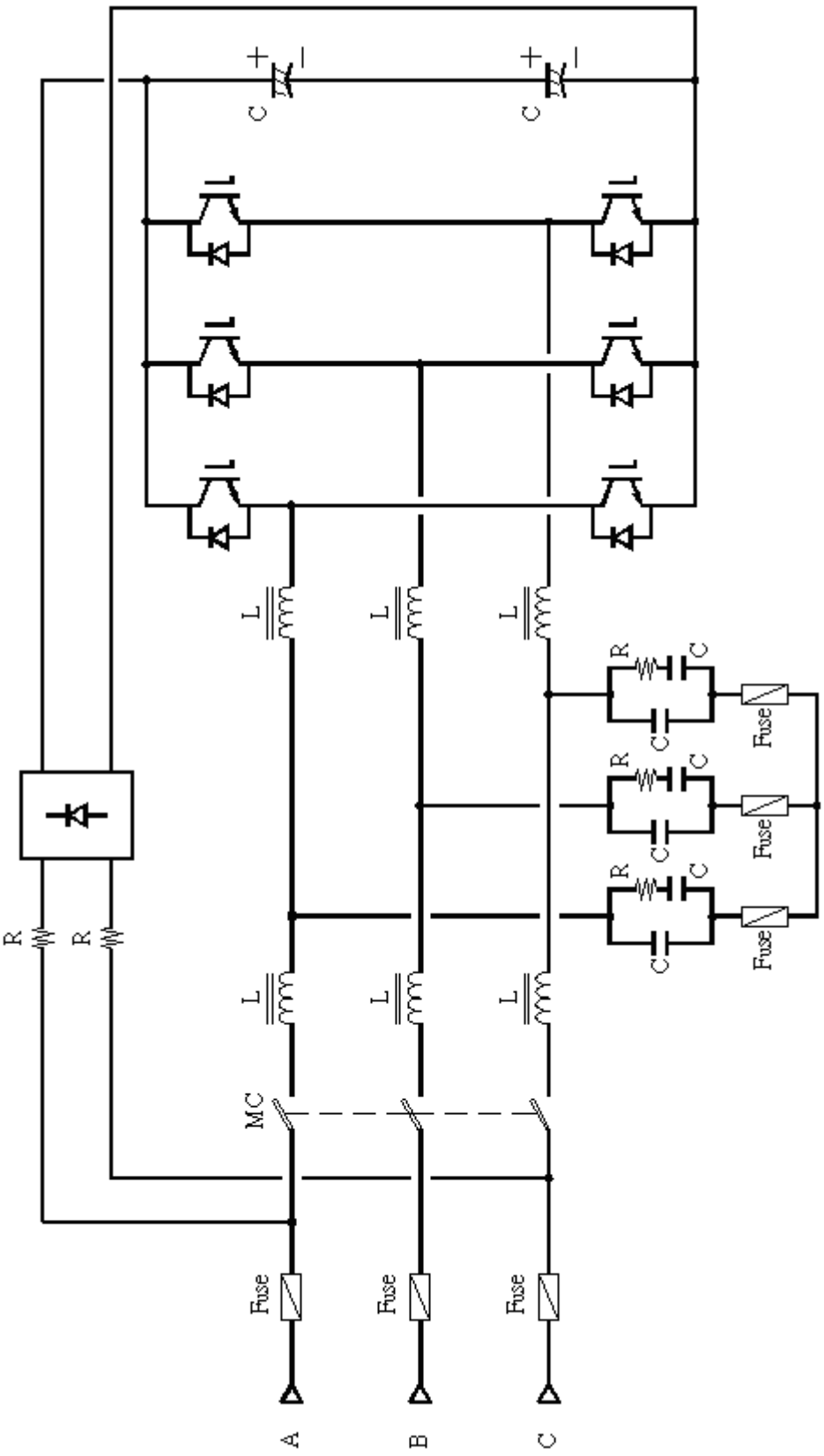


Fig. 1-2 *Matrix* PureSine Power Module System Schematic

General Characteristics and Specifications

General Characteristics

Storage Temperature	-4°F to +160°F / -20ºC to +70ºC
Operating Temperature	+32°F to +105°F / + 0ºC to +40ºC Derate 4% per 33°F/1ºC up to +122°F/50ºC
Relative Humidity	< 95%
Operating Altitude	<1000 m Derate 1% for every additional 100 m
Reference Harmonic Standard	IEEE 519-1992, EN 61000-3-4
Reference Design Standard	UL 508 / EN60146

Power Module Specification

Model Number / Item	PureSine - MPSPPMD
Input Voltage	480V +10%,-20%
Phase/Wires	3 phase 3 wires
Frequency	60±3 Hz
Maximum Compensation Current/Phase	35 Arms
De-rating Compensation Current/Phase (1)	30 Arms
Inrush Current	Less than rated current
Current Limitation	Yes, at full correcting
Maximum Heat losses	650 Watts
Color	RAL9011(PANTONE Process Black C)
Protection Index	IP20
Dimensions (WxHxD)	17.3" x 28.0" x 5.2" / 440 x 710 x 131mm
Weight	68.3lbs / 31 Kg

(1) When 2 and above Power Modules work in power scalable configuration, the power module will downgrade automatically from 35A to 30A. The rating is 60A/90A/120A, when 2/3/4 power modules are connected in parallel. If more than two (2) power modules are needed with a control module, the additional power modules must be installed using an additional wall mount kit. (MTE Part Number: MPSWMK)

DC Equalizer Module Specification

Model Number / Item	PureSine-MPSPDCD
Number of controllable Power Module	Up to 4 Power Modules.
Color	RAL9011(PANTONE Process Black C)
Protection Index	IP20
Dimensions (WxHxD)	17.3" x 13.1" x 1.7" / 440mm x 332.5mm x 42mm
Weight	9.9lbs / 4.5 Kg

Control Module Specification

Model Number / Item	PureSine-MPSPCCD
Input Voltage	480V +10%,-20%
Phase/Wires	3 phase 3 wires
Frequency	60±3 Hz (Auto Sensing)
Compensated Harmonic Orders	From 2nd to 51st order. Up to 12 orders actives simultaneously (2nd - 31st). Higher Order Compensation (32nd - 51st) can be Disabled/Enabled
Power Factor Correction	Compensate both lagging and leading reactive power.
	Power factor can be programmed from 0.7 lagging to 0.7 leading
CT Ratio	Can be set. Primary Current: 100A - 10000A Secondary Current: 1A(Standard)/5A (Optional)
CT Location	Source Side: Close Loop Control Load Side: Open Loop Control
Response Time	< 20 msec
Number of controllable Power Module	Up to 4 Power Modules. If more than two (2) power modules are needed with a control module, the additional power modules must be installed using an additional wall mount kit. (MTE Part Number: MPSWMK)
Parallel	Up to 8 Control Modules.
Maximum Heat losses	50 Watts
Color	RAL9011(PANTONE Process Black C)
Protection Index	IP20
Dimensions (WxHxD)	17.3" x 28.0" x 3.4" / 440mm x 710mm x 86mm
Weight	30.9lbs / 14 Kg

Control Panel Specification

LCD Control & Display Panel	a. 4-status LED indicators: POWER ON, FILTERING, FULL CORRECTING and ERROR b. ON/OFF and RESET key pads. c. 4 Directional Scrolling Keys/Enter Key/Escape key. d. LCD Display Panel offers following functions: ● Meter: parameter, waveform and spectrum views. ● Event Log: Up to 300 records (FIFO). ● Configuration: Compensation Setting, Compensation Logic Control and System Setting. ● Multi-language Setting: up to 10 different languages

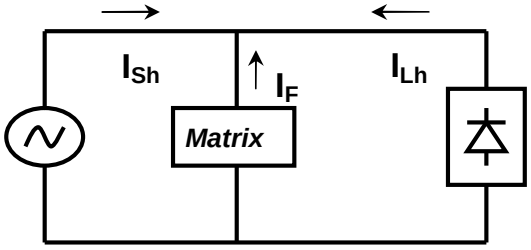
Communication Interface Specification

Dry Contact (Standard Configuration)	a. 5 Output Dry Contacts. b. 1 Input Dry Contact c. 1 EPO (Emergency Power Off)
Communication Interface	Standard : RS232/USB Optional: RS485/RS422 Ethernet Card
Programming	Setting by expert service software or LCD control panel.
Monitoring Software (Optional)	***MPSSOFT***
Communication Protocol	RS485/RS422: J-Bus/MOD Bus Protocol Ethernet: Ethernet TCP/IP

Compensation Ability

As long as the ***PureSine*** is started up and running, it provides harmonic current compensation as well as power factor correction; therefore, the current on the source side is less than that on the load side. In addition, the improvement of the voltage waveform distortion and the voltage regulation may increase the harmonic current on the load side. Therefore, the compensation capability analysis shall be down when the PureSine is running.

$$\text{Harmonic Attenuation Ratio (HAR)} = \frac{\text{Harmonic Current on Load side } (I_{Lh})}{\text{Harmonic Current on Source side } (I_{Sh})}$$



The harmonic current on the load side is measured when the PureSine is running.

Capacity Selection

The ***PureSine*** compensates harmonic current comprehensively, which does not require measuring the impedance of the power system or analyzing the load harmonic spectrum or its individual amplitude. As long as the estimated load harmonic current amplitude to be compensated is measured, then select the PureSine model, which has the output compensated current rating greater than 1.25 times of it. For example, if the load harmonic current is 40A, it is recommended to choose the 60A PureSine.

Even if the selected filter offers insufficient compensated harmonic current, the PureSine will not be at risk of overloading. It has current-limited capability up to its full rated compensating capability; therefore, it will not shut down or malfunction as most of passive filters do. Simply add Power Modules or Control Module in parallel on site to increase its compensated capability.

Table 1-1 Matrix PureSine 480V Capacity Selection

Voltage Rating	Current Capacity	Control Module + DC Equalizer Module +Power Module
480V	35A	PureSine-MPSPCCD + PureSine-MPSPDCD + PureSine-MPSPPMD x 1
	60A	PureSine-MPSPCCD + PureSine-MPSPDCD + PureSine-MPSPPMD x 2
	90A	PureSine-MPSPCCD + PureSine-MPSPDCD + PureSine-MPSPPMD x 2 + PureSine-MPSWMK x 1 + PureSine-MPSPPMD x 1
	120A	PureSine-MPSPCCD + PureSine-MPSPDCD + PureSine-MPSPPMD x 2 + PureSine-MPSWMK x 1 + PureSine-MPSPPMD x 2

NOTE: If more than two (2) power modules are needed with a control module, as listed above, the additional power modules must be installed using an additional wall mount kit. (MTE Part Number: MPSWMK)

2. The Function Explanations of Control and Power Modules

The PureSine is composed of one Control Module plus one or more Power Modules. The maximum output current of the PureSine is depended on the number of the Power Modules.

Control Module Function Explanations

The Control Module is the core control center of the PureSine, which analyzes the load current by DSP, then sends control signals to Power Module to compensate the compensated harmonic and reactive current required by the load.

The Control Module can be programmed via the LCD control panel or optional communication software. There are two types of the PureSine, Rack Mount[1] and Wall Mount. Fig. 2-1 and 2-2 show the different slots and wiring locations.

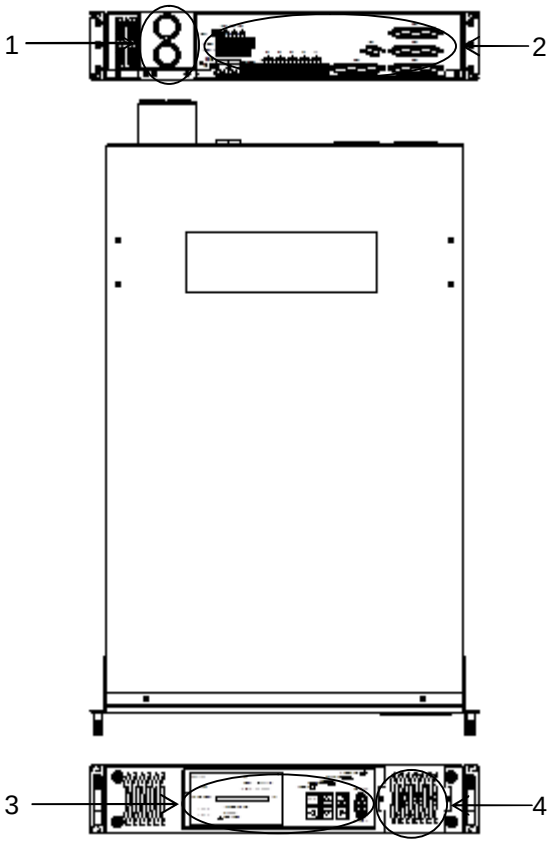


Fig. 2-1 Control Module - Rack Mount

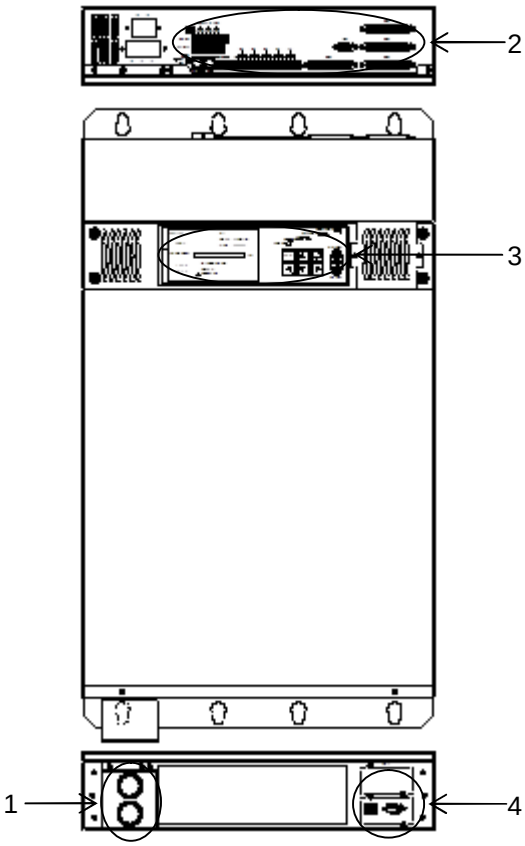


Fig. 2-2 Control Module - Wall Mount

1. Power Source Terminal Block
2. Control Signal Connectors
3. Control Panel
4. Communication Slots

[1]Note: Consult factory regarding Rack Mount filters

Power Source Terminal Block

A: Phase 1
B: Phase 2
C: Phase 3
G: Grounding
(Power Earth)

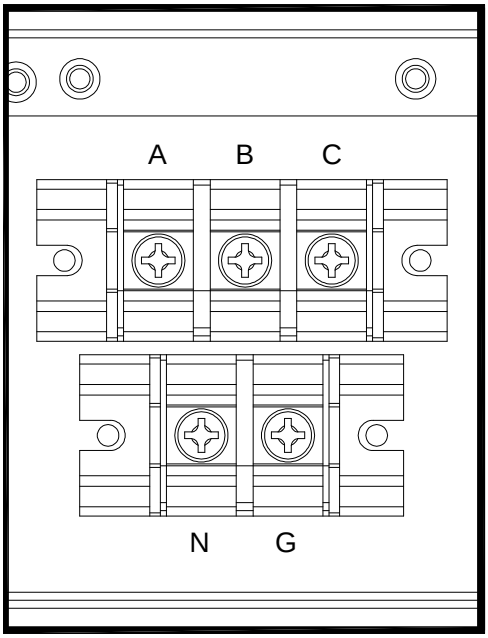


Fig. 2-3 Power Source Terminal Block of Control Module

Control Signal Connectors

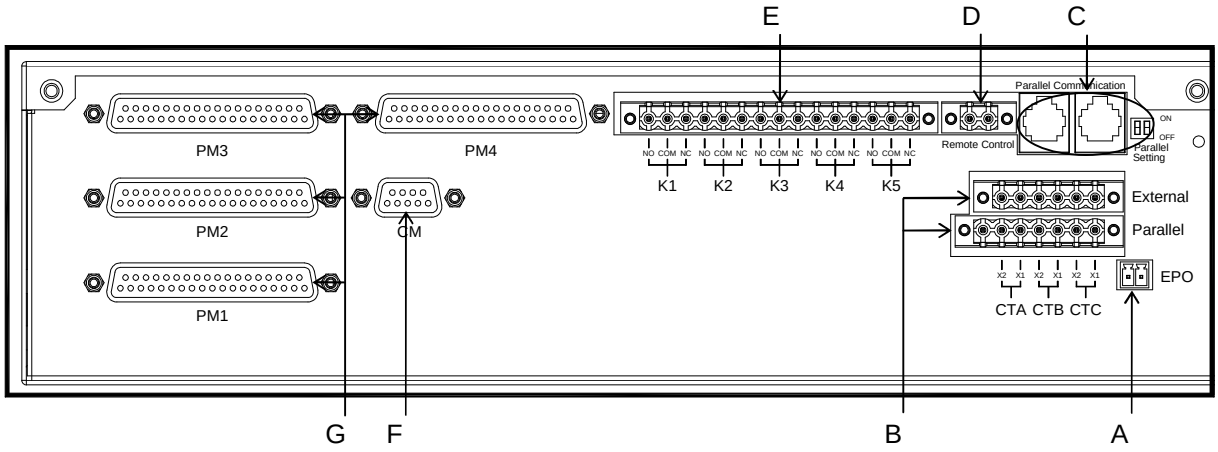


Fig. 2-4 Control Signal Connectors

A. Emergency Power Off (EPO)
B. CT Connectors
C. Parallel Communication Ports
D. Input Dry Contact
E. Output Dry Contacts
F. Control Signal Cable 1 Connector
G. Control Signal Cable 2 Connectors

Emergency Power Off (EPO)

The PureSine is equipped contacts for an EPO switch. The switch allows you to turn off the filter in emergency. If the LCD control panel is out of order you may shut down the filter through EPO switch. Short Pin 1 & Pin 2 of the switch, and the filter will be turned off immediately.

Fig. 2-5 EPO Switch

CT Connectors

External terminal connects with the External CTs. The default location is Source side. For Load side configuration, please contact local authorized service agent.

Parallel terminal connects with the Parallel CTs which have to install at the total output of the all filters when several Control Modules operate in parallel.

You may install these CTs as indicated as Fig. 2-6. The wire connections will be explained in detail in section **4. Installation and Wiring**.

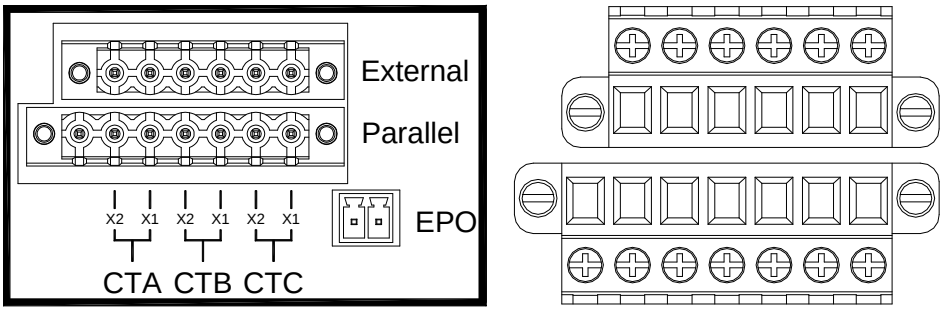
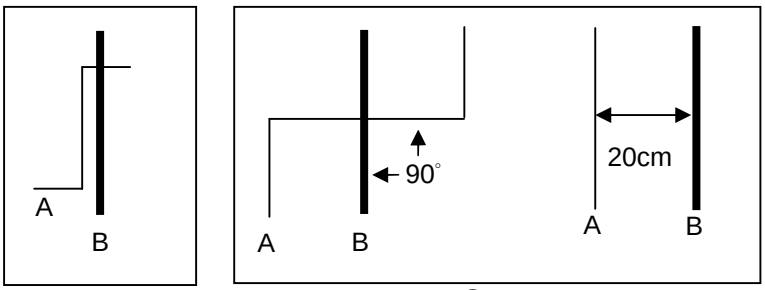


Fig. 2-6 CT Connection Terminals

Parallel Communication Ports

These ports are only used for parallel operation. To avoid any unnecessary noise interference, do not intercross or mix together the cables with power cables. If this is not possible, you must place them at 90 degree or at least 8" / 20cm apart, as shown in Fig. 2-7.



A → parallel communication or Control Signal cables

B → Power cables

Fig. 2-7 Recommended Layout of Parallel Communication Cables

The maximum total lengths of the parallel communication cables must be less than 66 Feet / 20 meters and must be connected as a ring type as shown in Fig. 2-8. To ensure proper communication, you must set the switches of the two farthest Control Modules to the "ON" position as shown in Fig. 2-8.

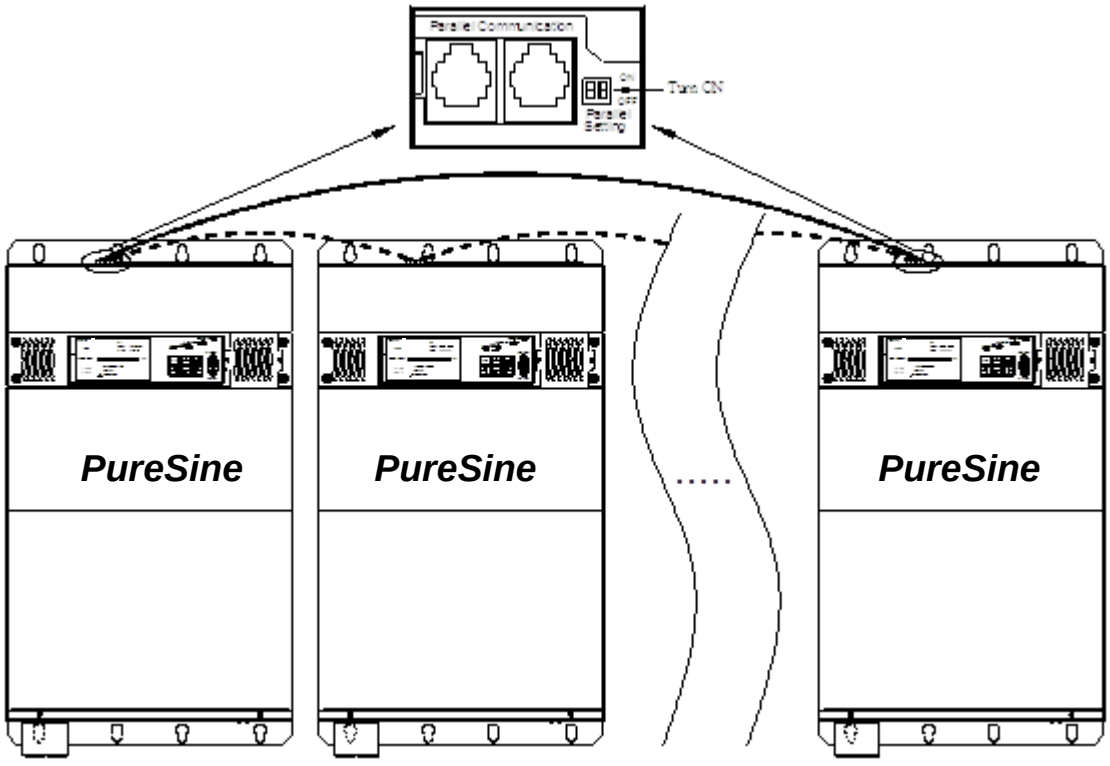
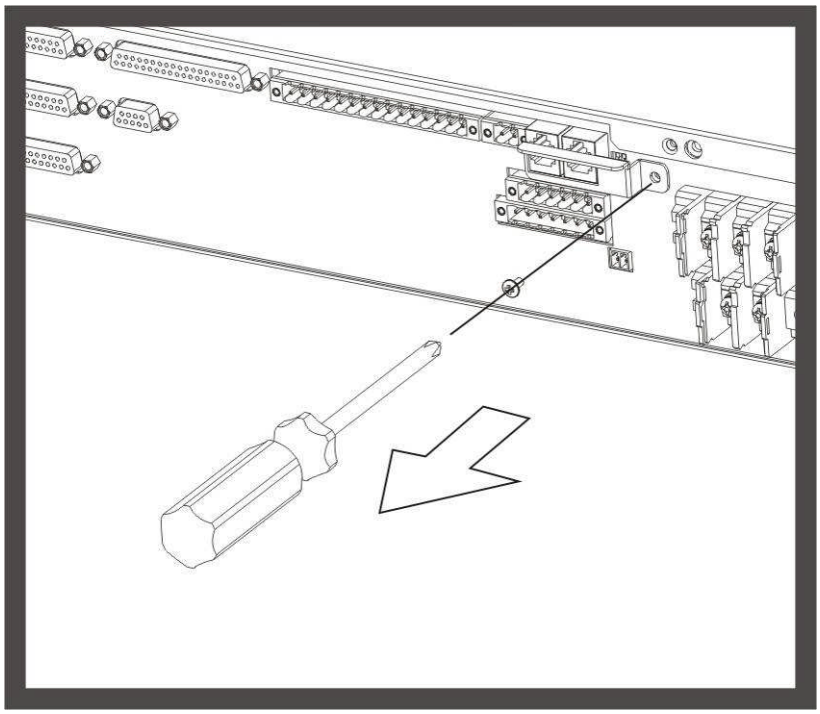


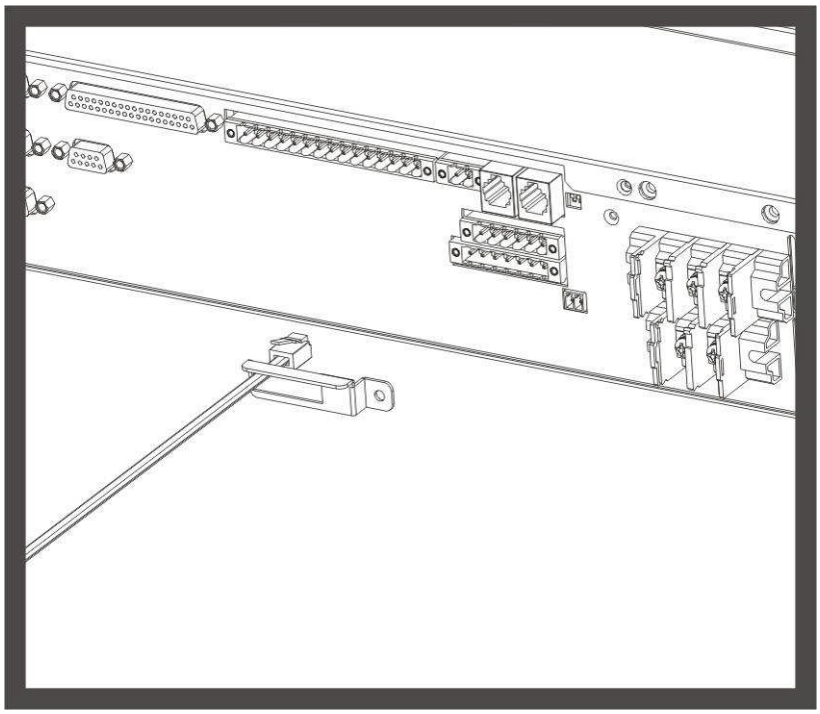
Fig. 2-8 Parallel communication cables connection diagram

The procedure for wiring the Parallel Communication Cable connection is shown below:

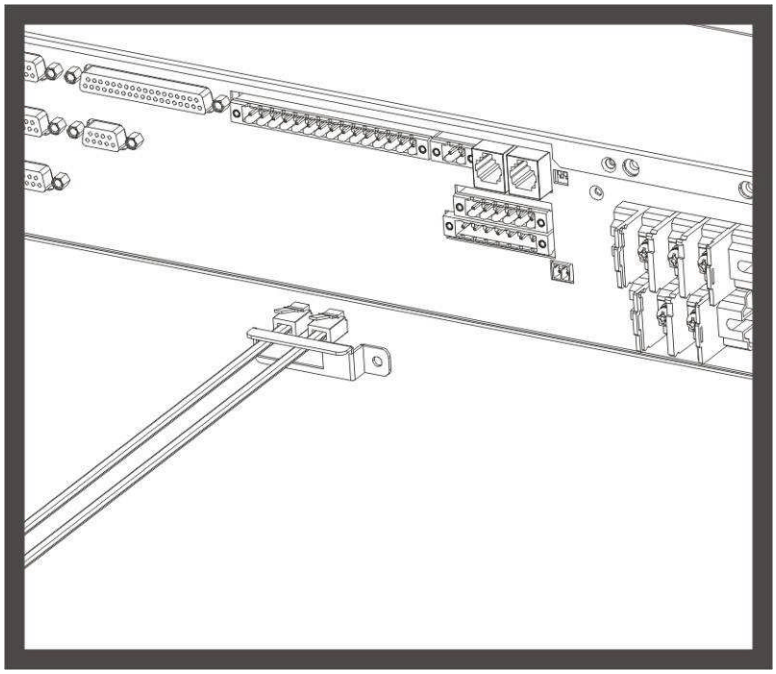
Step 1: Remove the fixed plate of the communication port.



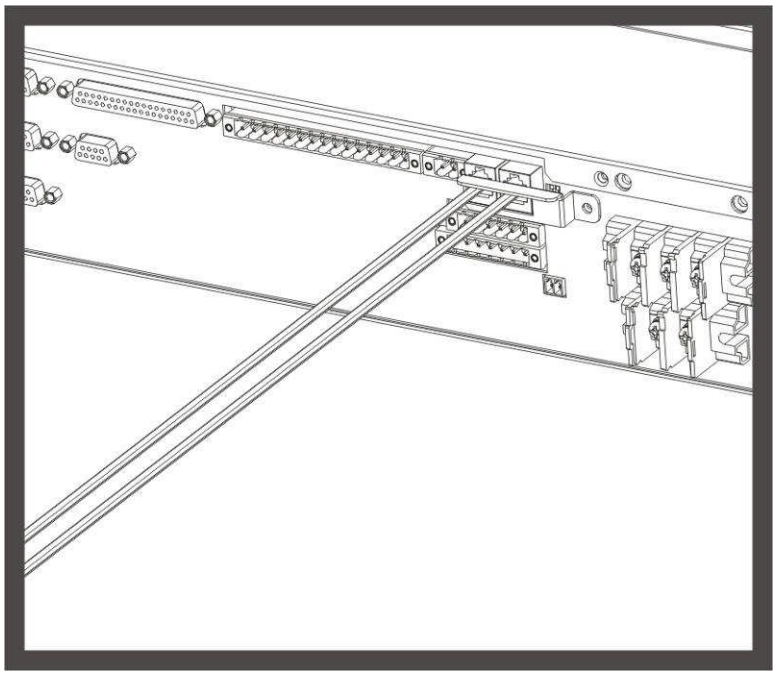
Step 2: Put the fixed plate through the RJ11 communication cable.



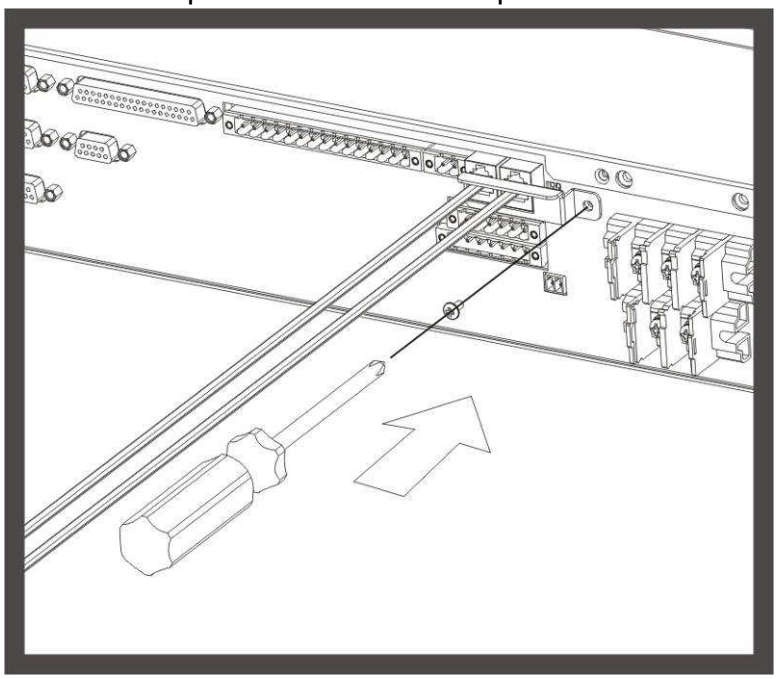
Step 3: Put the second RJ11 cable through the fixed plate.



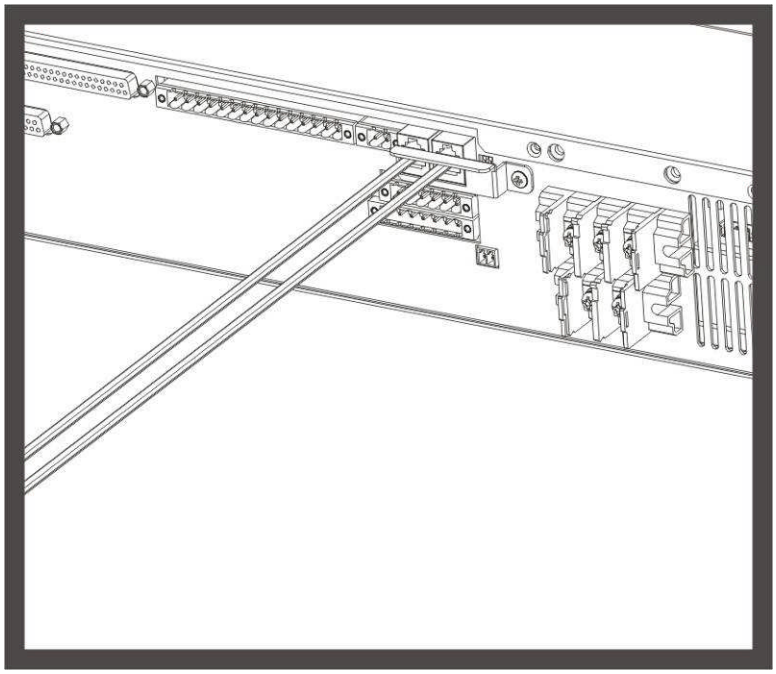
Step 4: Plug in the two RJ11 Jack cables to the communication port.



Step 5: Fasten the fixed plate back to the rear panel of the Control Module.



Step 6: The communication cables are installed properly.



Notice: Make sure the filter is turned off when the above procedure is performed. After the connection of the RJ11 cables is complete, you must to set the parallel numbers and the parallel identification numbers of the Control Modules. Incorrect settings will result in an alarm and the unit will not operate. Consult with local an authorized service agent for setting of the parallel numbers.

Input Dry Contact

These terminals can be connected to an external switch, which can be used to turn on/off the filter. There are two operation modes can be selected, Mode 0 and Mode 1. The default mode is Mode 0, but you may change the operation mode to Mode 1 via the monitoring software ***SineSync*** or consult with local authorized service agent.

Operation Mode: Mode 0：

Please refer to Fig. 2-9 to connect an external Tack Switch that can turn the filter on/off. If you press the switch for 2 seconds, the filter will change the status from on to off and vice versa as indicated as Fig. 2-10.

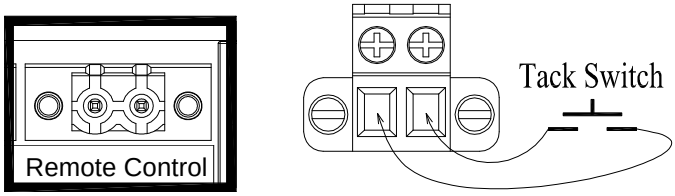


Fig. 2-9 Input Dry Contact Connection Diagram for Mode 0

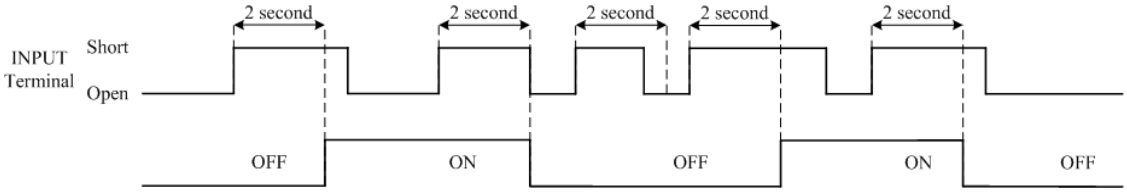


Fig. 2-10 Operation Method Diagram for Mode 0

Operation Mode: Mode 1：

Please refer to Fig. 2-11 to connect an external Switch in order to control on/off the filter. If you press to close the switch for 2 seconds, the filter will be started up; on the contrary, you press to close the switch for 2 seconds the filter will be shut down as indicated in Fig. 2-12.

When the operation mode is set at Mode 1, please close the external Switch first, and then press the ON/OFF keypad on the Control Panel to set the filter at standby mode (FILTERING LED is blinking.). Then, you may control on/off the filter from the external Switch.

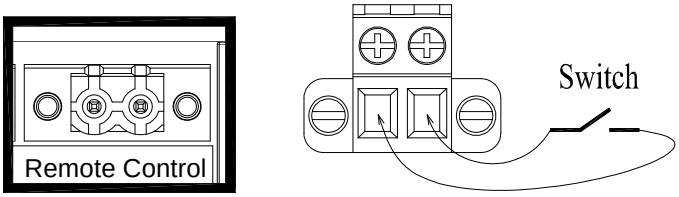


Fig. 2-11 Input Dry Contact Connection Diagram for Mode 1

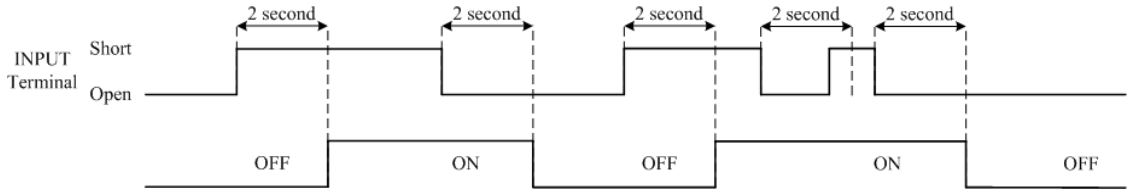


Fig. 2-12 Operation Method Diagram for Mode 1

Output Dry Contacts

There are 5 Output Dry Contacts offered for remote monitoring. The pin assignments are shown in Fig. 2-13. These contacts are individually programmable and can be set using the ***SineSync*** software or consult with local authorized service agent. The default operation of the output dry contacts is shown in Table 2-1.

Electrical specification: 250Vac/2A

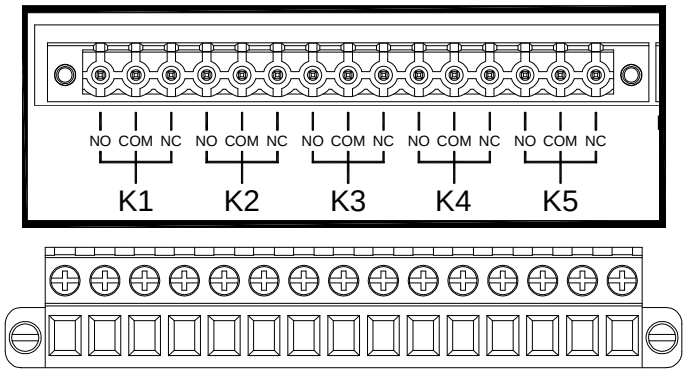


Fig. 2-13 Pin Assignments of Output Dry Contacts

Port	Function	Description
K1	POWER ON	The control logic circuits of Control Module are energized.
K2	FILTERING	The filter is providing the compensating current to the load.
K3	FULL CORRECTING	The capacity of the filter is not enough for the load needed. At this time, The filter should be in current limit and continue to compensate the current up to its rated value.
K4	ERROR	There are some possible external abnormal conditions or internal abnormal breakdown. The filter should stop to provide any compensating current.
K5	DC Bus Error	The DC Bus voltage is abnormal.

Table 2-1 Default Definition Table of the Output Dry Contacts

Control Signal Cable 1 Connector

It is connected to the Power Module. When more than one Power Module is connected, connect the wires to the PM1 of the Master Power Module.

Control Signal Cable 2 Connectors

There are 4 Control Signal cables (PM1~PM4), which means you may connect up to 4 Power Modules. Make sure you connect the Power Module in sequence from PM1 to PM4. The cable connected to PM1 is the Master Power Module as shown in Fig. 2-14.

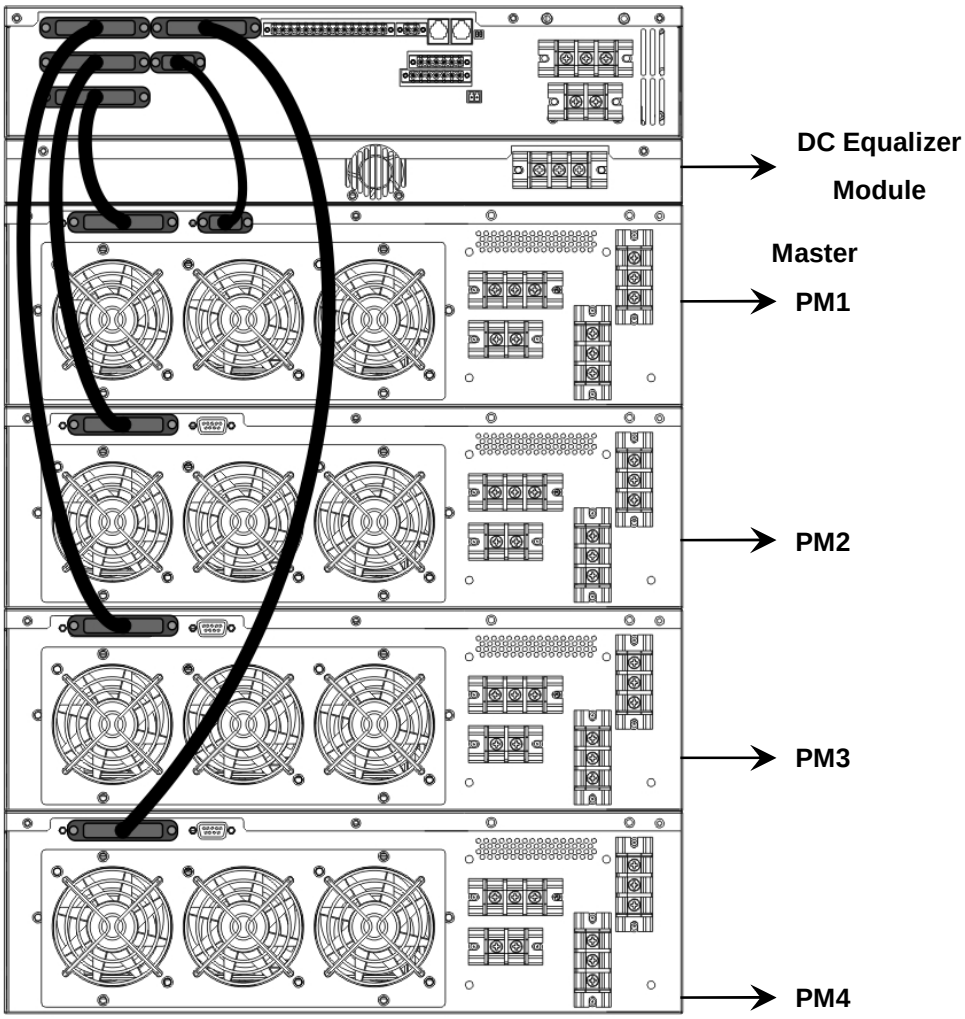


Fig. 2-14 Connection Diagram for Control Signal Cables

Fig. 2-14 illustrates the location of the control signal cables ONLY. If more than two (2) power modules are needed with a control module, the additional power modules must be installed using an additional wall mount kit. (MTE Part Number: MPSWMK)

LCD Control Panel

The LCD control panel has 8 control keys, 4 status indicators, and 1 LCD display, primary functions are:

- To control the On/Off of the filter.
- To silence alarm or clear fault status.
- To indicate all operation status of the filter.
- To display the parameters related power system.
- To display the waveforms of voltage and current.
- To display the measurement and spectrum of harmonics.
- To offer a graphical interface.

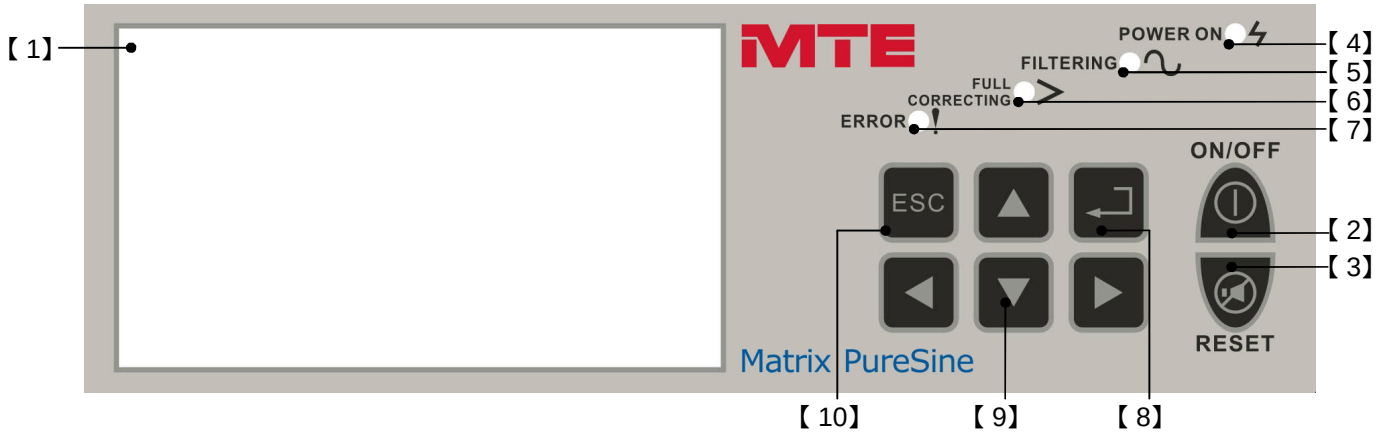


Fig. 2-16 LCD Operation Panel

1. Graphic Display Screen
2. ON/OFF Keypad
3. RESET Keypad
4. POWER ON Indicator
5. FILTERING Indicator
6. FULL CORRECTING Indicator
7. ERROR Indicator
8. Confirmation/Enter Key
9. Directional Scrolling Keys
10. Escape/Cancel Key

Communication Slots

As standard the filter offers both an RS232 and USB interface. RS485/RS422 and Ethernet cards are options. (See section **5. Optional Communication Card** for more details.) The installation location of the optional cards is shown in Fig. 2-17.

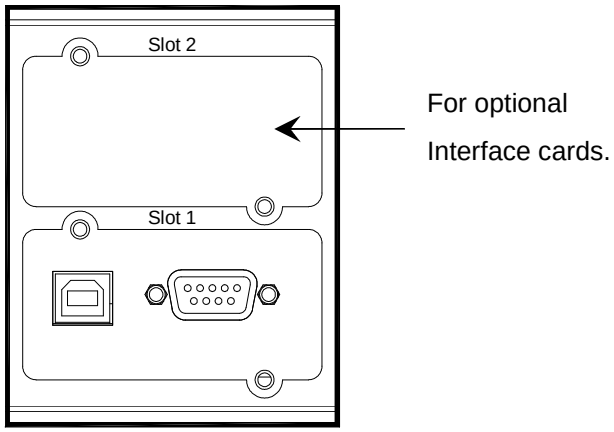


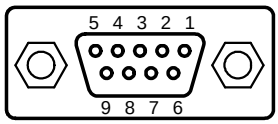
Fig. 2-17 Communication Slots

RS232 Communication Port

Communication Interface Configuration：

baud rate	Programmable，2400 bps~57600bps. Default setting 57600bps
data length	8 bits
stop bit	1 bit
parity	NO

Pin Assignment:



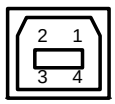
Pin2→RS-232C TX
Pin3→RS-232C RX
Pin5→Ground

USB Communication Port

Comply with USB V.1.0，1.5Mbps

Comply with USB HID (Human Interface Device) V.1.0

Pin Assignment:



1 → VCC (+5V)
2 → D-
3 → D+
4 → Ground

The filter is accompanied with a Windows version of the setting tool. The tool can set the IP, Baud Rate & ID of the filter. For more information, please refer to section **5. Optional Communication Card**. Optional monitoring software, ***SineSync***, may be purchased from local authorized service agent.

Power Module Function Explanation

The Power Module is designed to compensate harmonic current and reactive power. There are two types of Power Module, Wall Mount and Rack Mount[1]. The wiring positions for these two types are different as shown in Fig. 2-18 and 2-19.

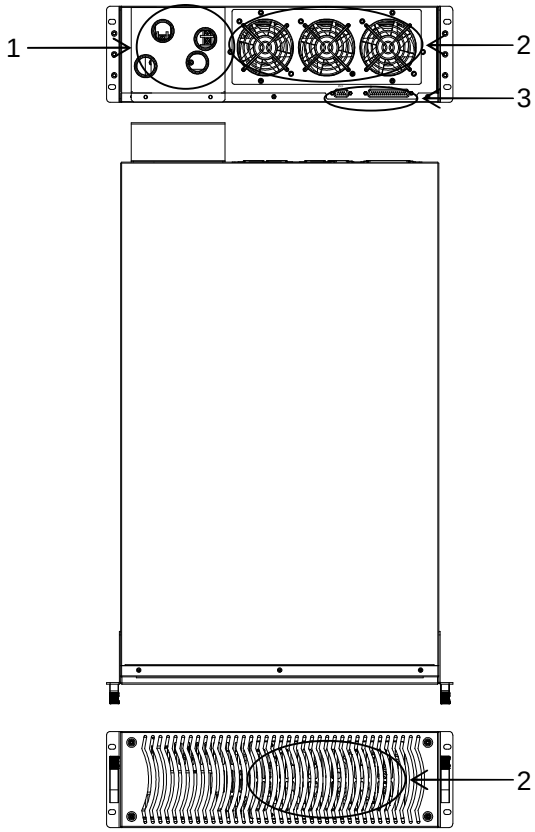


Fig. 2-18 Power Module Wiring - Rack Mount

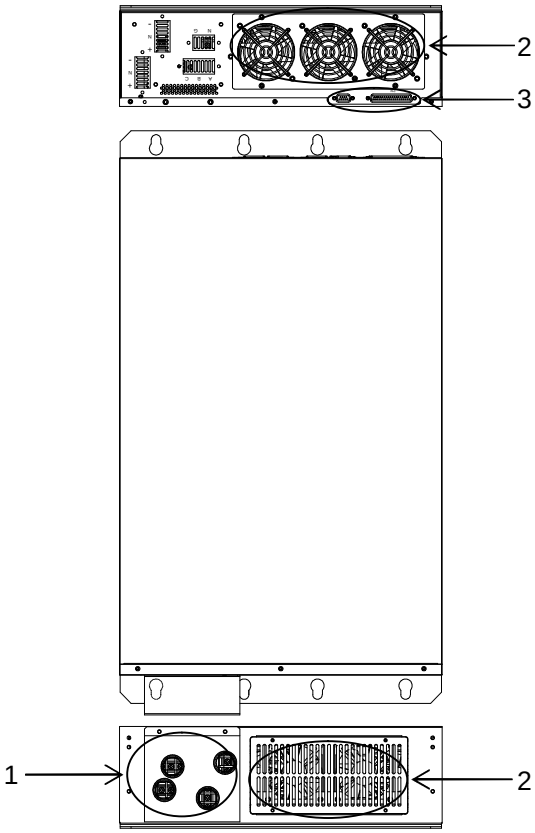


Fig. 2-19 Power Module Wiring - Wall Mount

1. Power Source Terminal Block
2. Cooling Fan and Ventilation Openings
3. Control Signal Connectors

[1]Note: Consult factory regarding Rack Mount filters

Power Source Terminal Block

A: Phase 1

B: Phase 2

C: Phase 3

G: Grounding (Power Earth)

+ N -: DC Bus Terminal

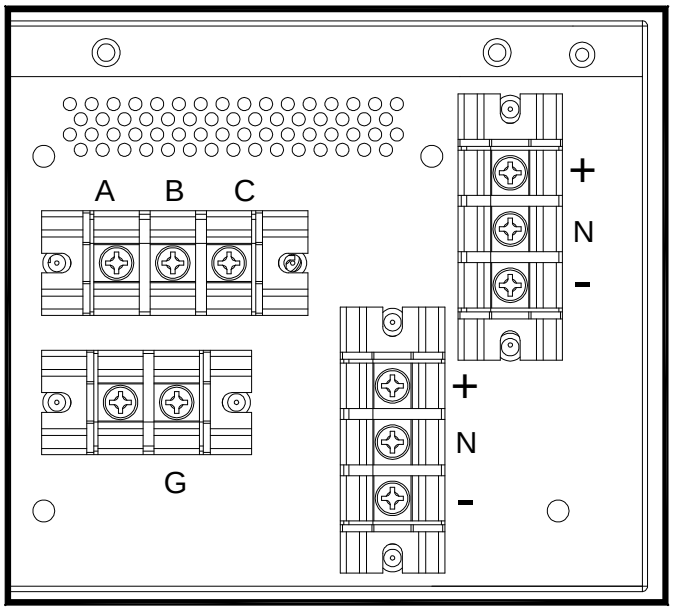
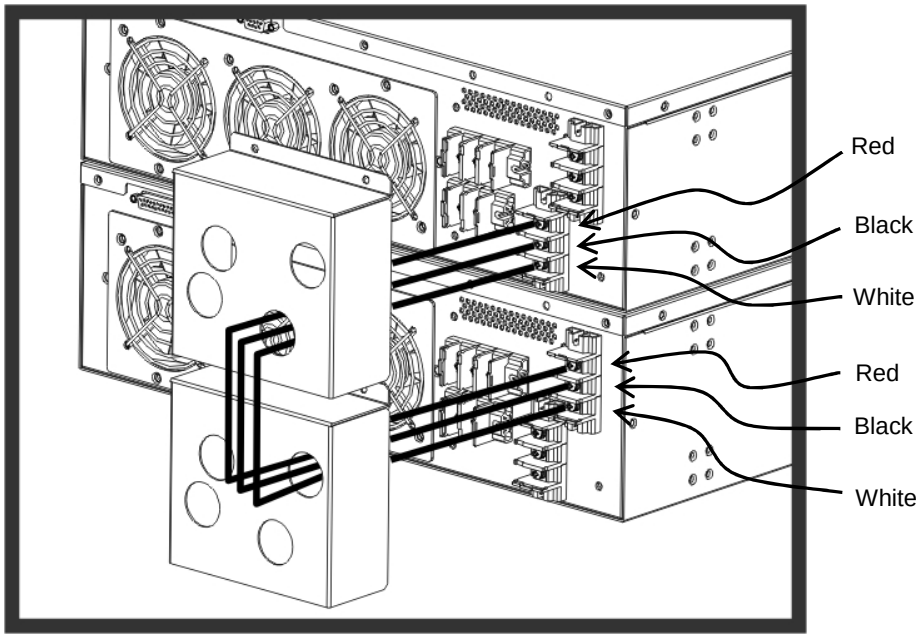


Fig. 2-20 Power Source Terminal of the Power Module

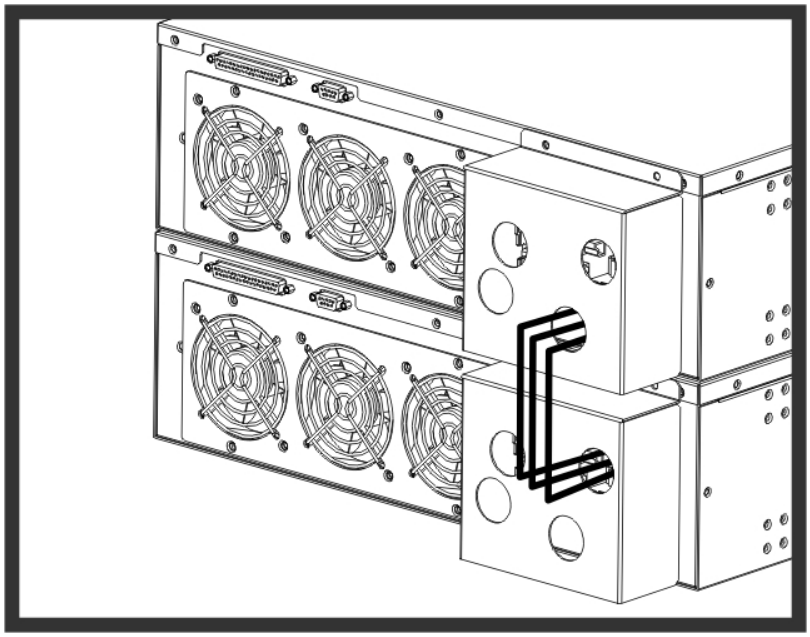
When multiple Power Modules are connected, you must connect the DC1&DC2 of each Power Module in parallel, the procedure is:

Step 1：Remove the cover of the terminal and connect the wires to the terminals as indicated below.



Notice: Red Cable connects to the "+" terminal; Black Cable connects to the "N" Terminal, and the White Cable connects to the "-" terminal. These cables come with the Power Module.

Step 2：The DC Bus connections for two Power Modules are complete.



Cooling Fan and Ventilation Openings

The purpose of the cooling fan and ventilation openings is to get rid of the heat generated by the Power Module. To avoid the Power Module from overheating, make sure there are no obstacles blocking the ventilation openings.

Control Signal Connectors

There are two control signal connectors, one is CM and the other is PM, are connected to the Control Module. The connection is shown in Fig. 2-14. Only Master Power Module has to connect both CM and PM connectors with Control Module, other Power Modules only connect PM connector.

DC Equalizer Module Function Explanation

The DC Equalizer Module is connected to Power Module DC Bus terminal to balance the DC Capacitor voltage of Power Module. The wiring position for Wall Mount and Rack Mount[1] type is shown in Fig. 2-21 and 2-22.

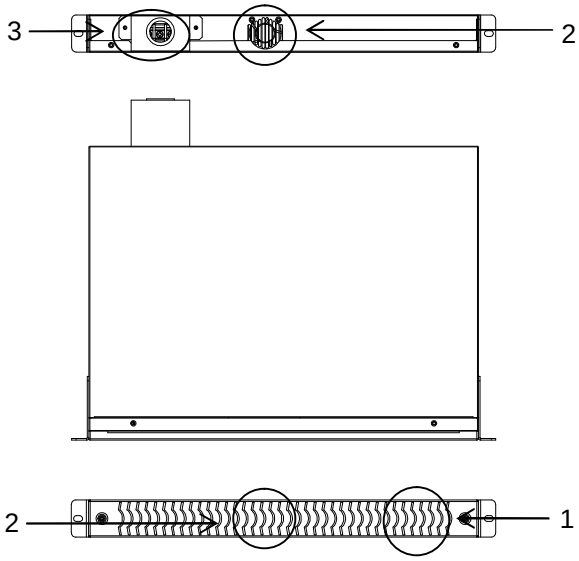


Fig. 2-21 DC Equalizer Module - Rack Mount

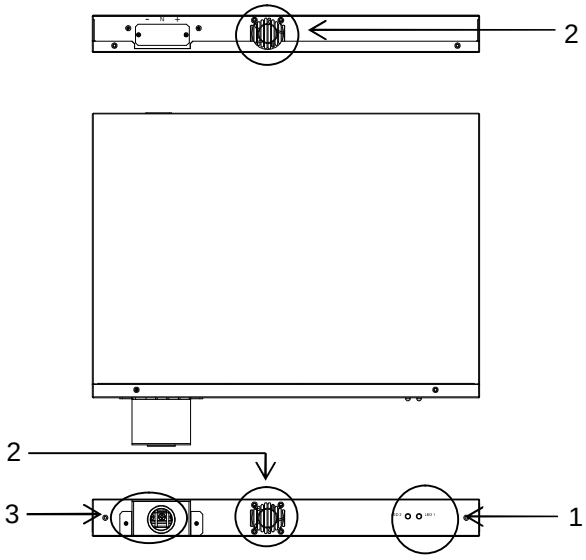


Fig. 2-22 DC Equalizer Module - Wall Mount

1. LED indicators
2. Cooling Fan and Ventilation Openings
3. DC Bus Terminal

[1]Note: Consult factory regarding Rack Mount filters

LED Indicators

Indicator	Color	Description
LED1	Green	The DC Equalizer Module is working properly.
LED2	Red	There is a problem with the DC Equalizer Module is and has stopped working.

Table 2-3 LED Indicators on DC Equalizer Module

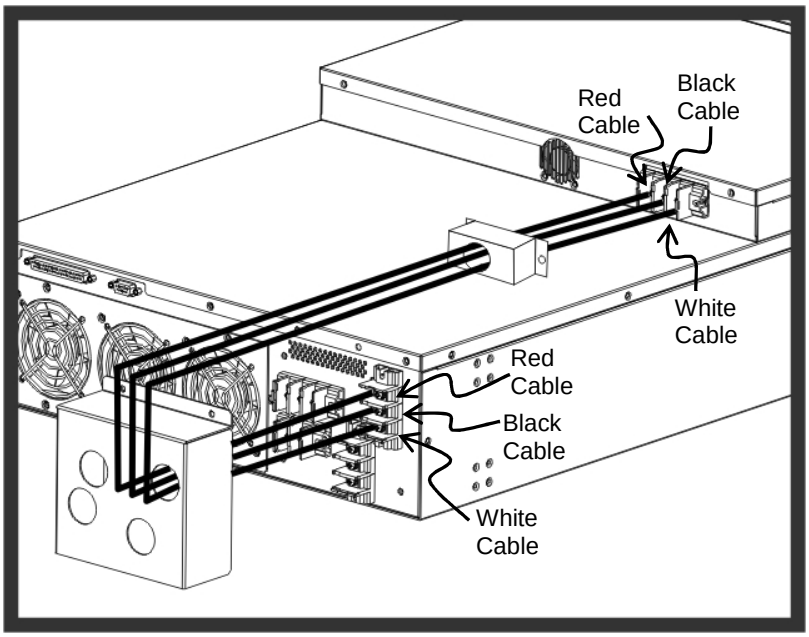
Cooling Fan and Ventilation Openings

The purpose of the cooling fan and ventilation openings is to get rid of the heat generated by the DC Equalizer Module. To avoid the DC Equalizer Module from overheating, make sure there are no obstacles blocking the ventilation openings.

DC Bus Terminal

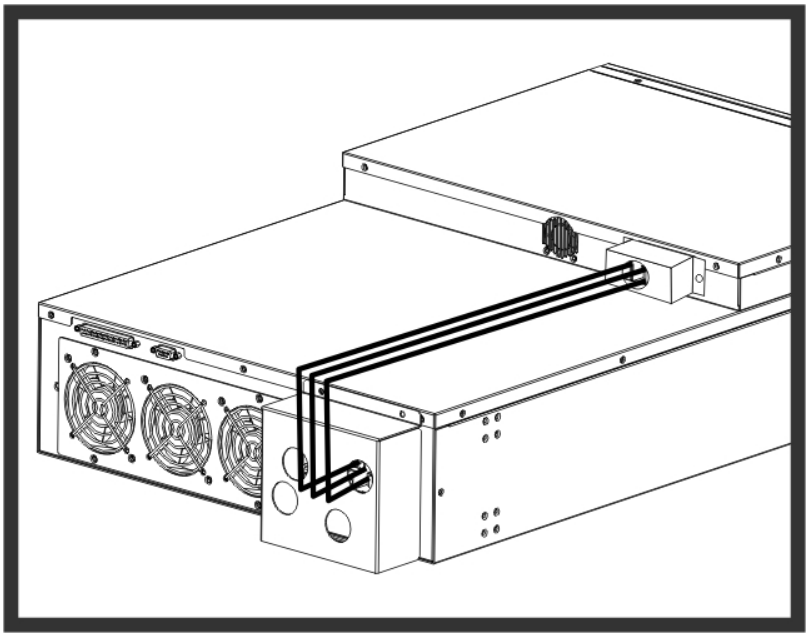
DC Equalizer Module has to connect to the DC Bus terminal of one of the Power Modules. The connection procedure is as follows:

Step 1: Remove the cover of the DC Bus terminals and connect the wires to the terminals as indicated below.



Notice: Red Cable connects to the "+" terminal; Black Cable connects to the "N" Terminal, and the White Cable connects to the "-" terminal. These cables come with the DC Equalizer Module.

Step 2: The DC Bus connection for Power Module and DC Equalizer Module are complete.



3. LCD Control Panel Function Explanation

Fig. 3-1 indicates the block diagram of the function provided by the LCD control panel.

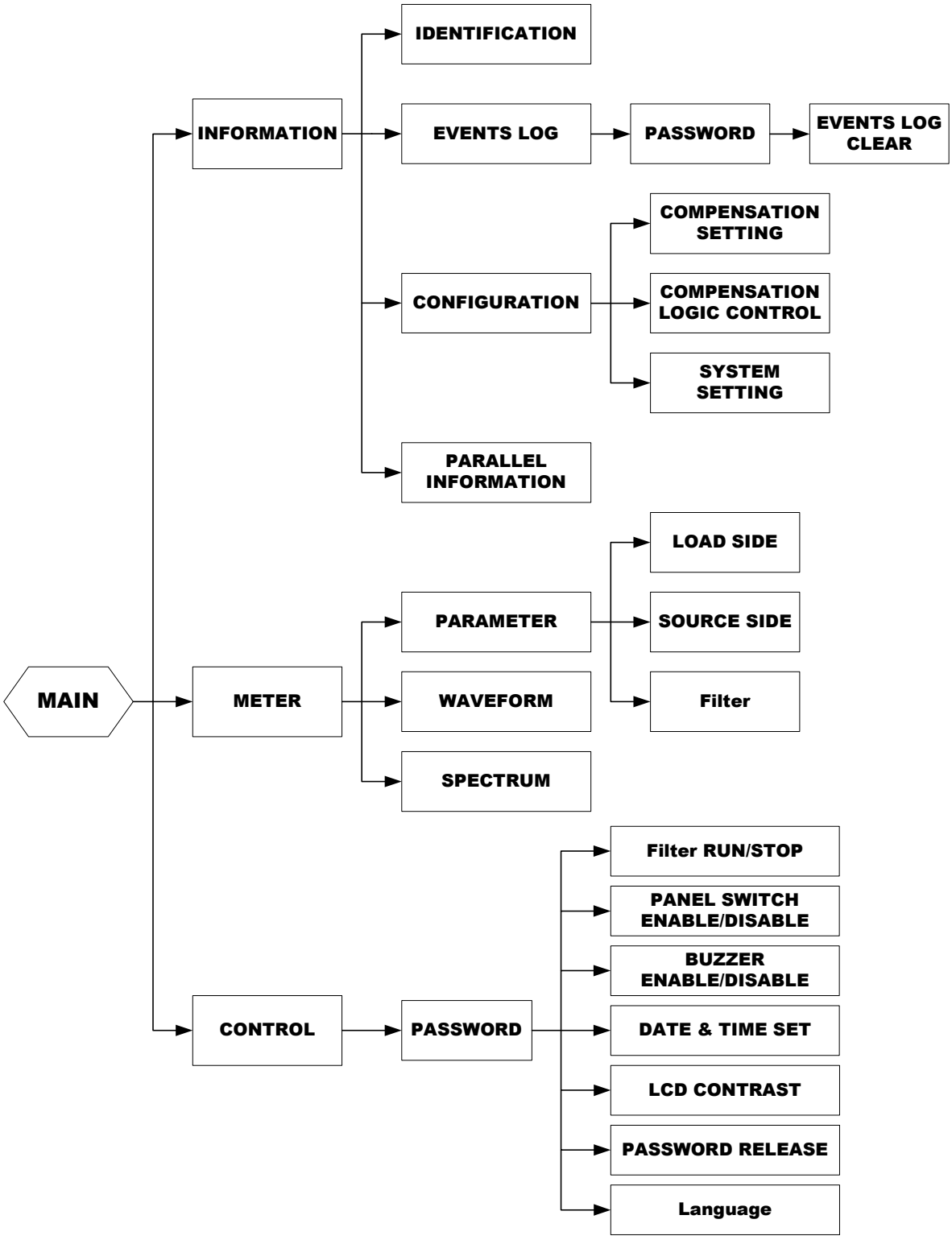
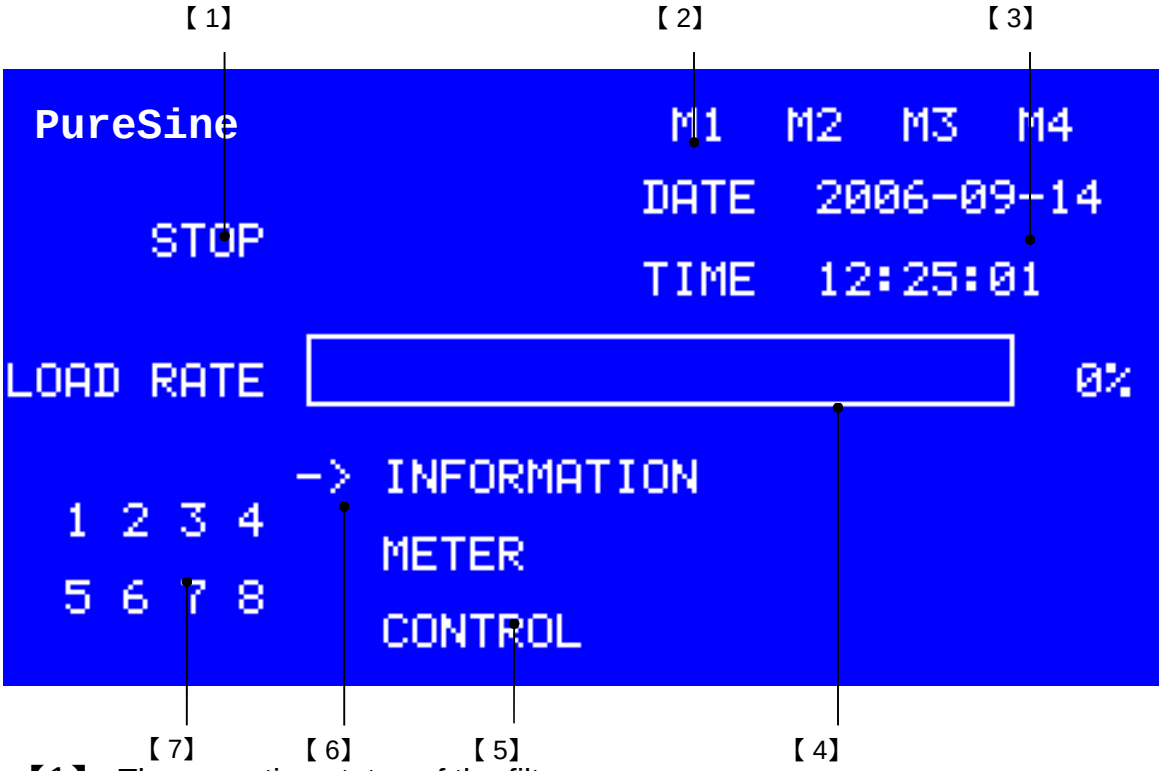


Fig. 3-1 LCD Control Panel Function Block Diagram

Main Screen Function Explanation



【1】 The operation status of the filter.
"RUNNING >>>>"
"STOP"

【2】 Power Module status
M1/M2/M3/M4 Display: Power Module is connected with Control Module.
M1/M2/M3/M4 Blinking: Power Module abnormal.
M1/M2/M3/M4 Hide: Power Module is not connected.

【3】 Current date and time

【4】 Percentage of compensation capacity

【5】 Main Menu

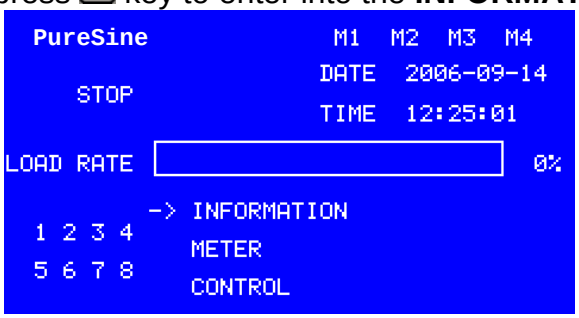
【6】 Cursor: Use ▼ ▲ keys to move the cursor

【7】 Control Module Parallel Status
1/2/3/4/5/6/7/8 Display: The specify Control Module has communicated with other Control Module.
1/2/3/4/5/6/7/8 Hide: The specify Control Module is disconnected.

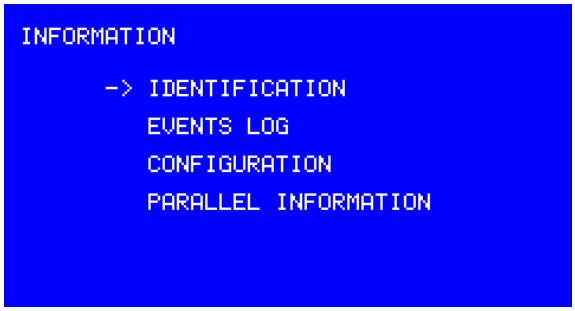
INFORMATION

IDENTIFICATION

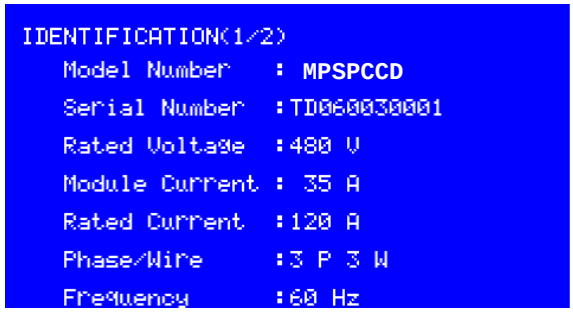
1) In the Main screen, move the cursor to the **INFORMATION** by using ▼ ▲ keys and then press ↵ key to enter into the **INFORMATION** page.



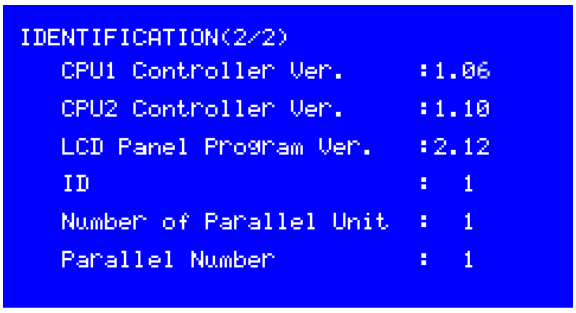
2) Move the cursor by using ▼ ▲ keys to the **INDENTIFICATION** and then press ↵ key to enter into the **IDENTIFICATION** page.



3) You will get all factory data set in the filter.



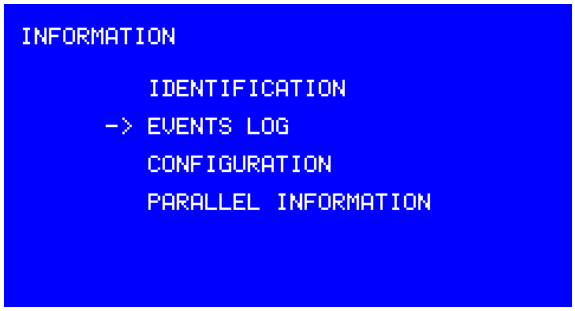
4) Use ▼ ▲ keys to change to another page.



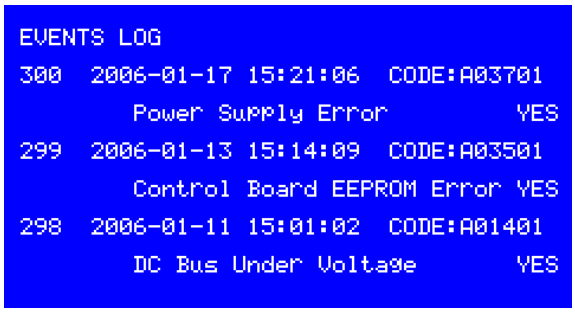
Model Number : Model Number of Control Module
Serial Number :
Rated Voltage : The voltage rating of this filter.
Module Current : Current rating of each Power Module
Rated Current : Total current rating of this filter
Phase/Wire : Power system 3P3W that the filter connected.
Frequency : System frequency 50/60Hz
CPU1 Controller Ver. : CPU1 of main control board program version.
CPU2 Controller Ver. : CPU2 of main control board program version.
LCD Panel Program Ver. : LCD control panel CUP program version.
ID : Identification number for remote monitoring control.
Number of Parallel Unit : The numbers of the Control Module in parallel.
Parallel Number : The parallel number of the Control Module.

EVENTS LOG

1) Move the cursor by using ▼ ▲ keys to the **Events Log** and then press ↵ key to enter into the **EVENTS LOG** page.

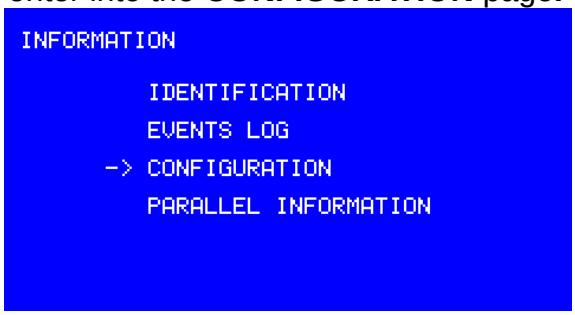


2) It shows the latst 3 log event records when you enter into the **EVENTS LOG** page. You may browse other records by using ▼ ▲ keys. Each LCD control panel may record max. 300 latest events log records. It means the record is storaged according to FIFO(First-in First-out) principle.

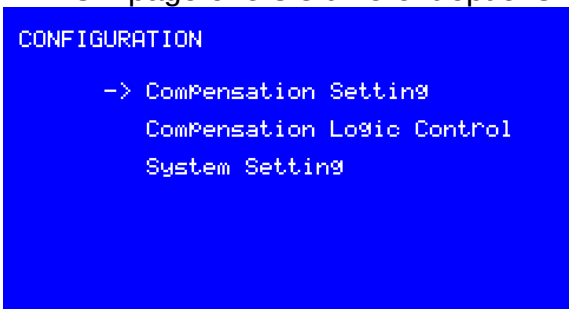

EVENTS LOG
300 2006-01-17 15:21:06 CODE:A03701
Power Supply Error YES
299 2006-01-13 15:14:09 CODE:A03501
Control Board EEPROM Error YES
298 2006-01-11 15:01:02 CODE:A01401
DC Bus Under Voltage YES

CONFIGURATION

1) Move the cursor to the **CONFIGURATION** by using ▼ ▲ keys and then press ↵ key to enter into the **CONFIGURATION** page**.**



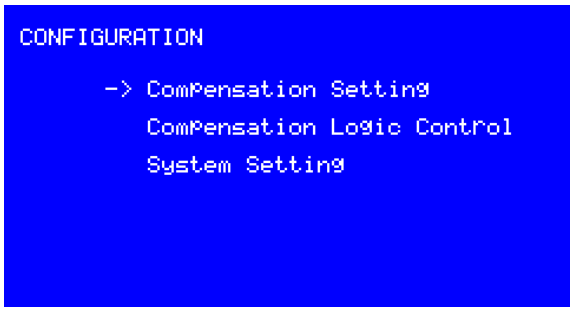
2) This **CONFIGURATION** page offers 3 different options.



These settings are not programmable. If you need to change any setting, you have to consult with local authorized service agent.

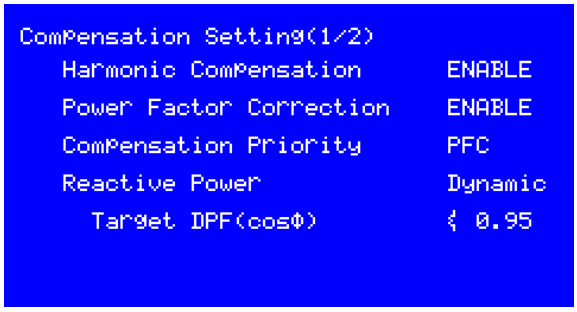
Compensation Setting

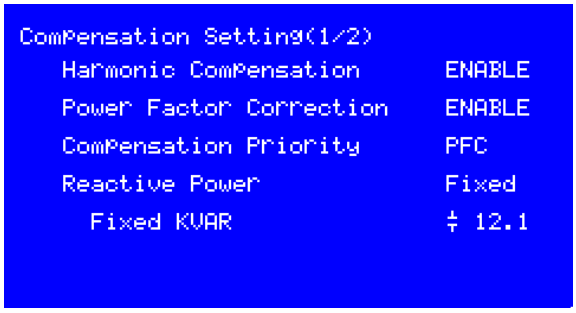
1) Move the cursor to the **Compensation Setting** by using ▼ ▲ keys and then press ↵ key to enter into the **Compensation Setting** page. The PureSine will prompt you for a password; just press ↵ to **DISPLAY** the settings.



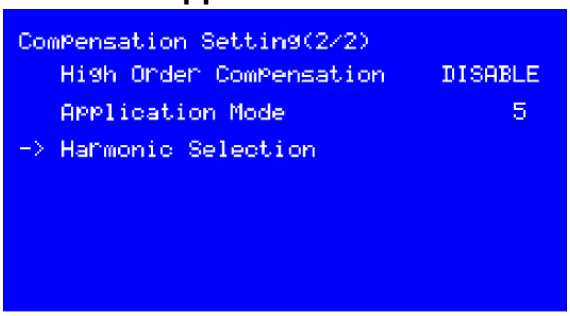
2) You may see the information when entering into the **Compensation Setting** page and the detailed information as below:

Harmonic Compensation	To show Harmonic Compensation is enabled or disabled.
Power Factor Correction	To show Power Factor Correction is enabled or disabled.
Compensation Priority	To show the setting priority of the compensation, either Harmonic Compensation or Power Factor Correction.
Reactive Power	To show the reactive power compensation mode is Target DPF or Fixed KVAR when Power Factor Correction is enabling.
Target DPF (cosΦ)	To show the setting of Target DPF.
Fixed KVAR	To show the setting of Fixed KVAR.
High Order Compensation	The filter can compensate from 31st to 51st harmonic orders, if this function is enable.
Application Mode	The filter builds several control parameters for different type loads to obtain the best performance. 0 For 3P3W 6pulse rectifier. 1 For 3P3W 6pulse rectifier. 2 For 3P3W 6pulse rectifier. 3 For 3P3W 6pulse rectifier. 4 For 3P3W 6pulse rectifier. 5、6 For 3P3W 6pulse rectifier.(Default)
Harmonic Selection	To show the information of selected harmonic orders.

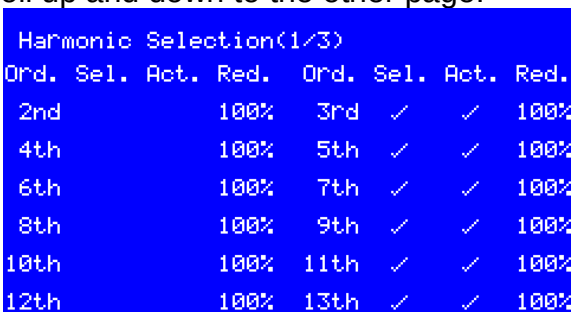




3) Scroll down the screen to another page of the **Compensation Setting** by using ▼ ▲ keys, then you may see the options—They are **High Order Compensation** 、**Application Mode** and **Harmonic Selection**.

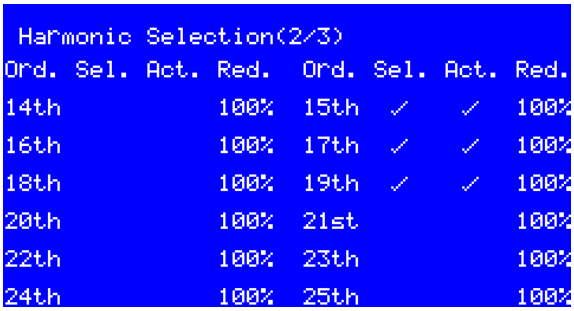


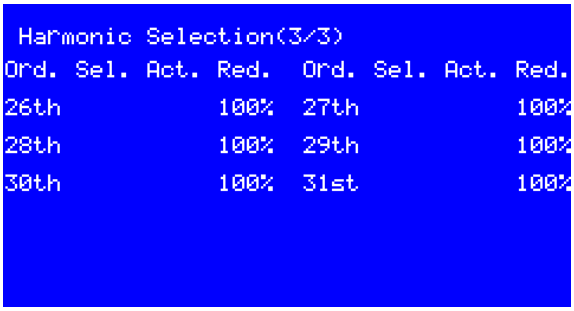
4) First page shows the status of 2nd order to 13th order**.** You may use ▼ ▲ keys to scroll up and down to the other page.


Harmonic Selection(1/3)
Ord. Sel. Act. Red. Ord. Sel. Act. Red.
2nd 100% 3rd ✓ ✓ 100%
4th 100% 5th ✓ ✓ 100%
6th 100% 7th ✓ ✓ 100%
8th 100% 9th ✓ ✓ 100%
10th 100% 11th ✓ ✓ 100%
12th 100% 13th ✓ ✓ 100%

Ord. **:** Harmonic order
Sel. **:** The selected harmonic order.
Act. **:** The active harmonic order.
Red. **:** The reduction ratio for the specific order.

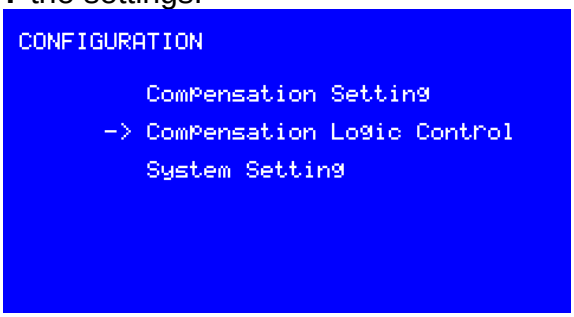
5) Second page shows the status of 14th order to 25th order and third page shows the status of 26th order to 31st order.


Harmonic Selection(2/3)
Ord. Sel. Act. Red. Ord. Sel. Act. Red.
14th 100% 15th ✓ ✓ 100%
16th 100% 17th ✓ ✓ 100%
18th 100% 19th ✓ ✓ 100%
20th 100% 21st 100%
22th 100% 23th 100%
24th 100% 25th 100%



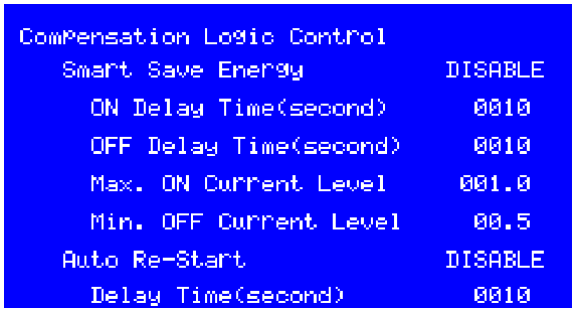
Compensation Logic Control

1) Move the cursor to the **Compensation Logic Control** by using ▼ ▲ keys and then press ↵ key to enter into the **Compensation Logic Control** page. The PureSine will prompt you for a password; just press ↵ to **DISPLAY** the settings.



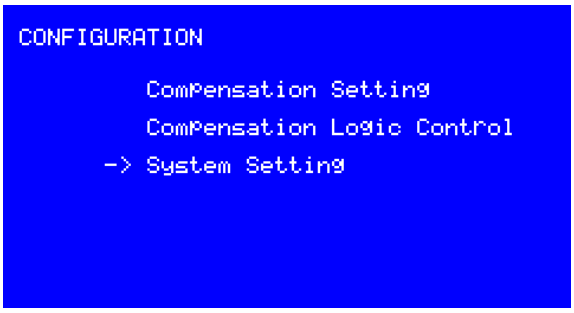
2) You may see the information when entering into the **Compensation Logic Control** page and the detailed information as below:

Smart Save Energy	Smart Save Energy	When this function is enabled, the filter can start-up or shutdown automatically, according to the load current level. When the load current less than Min. OFF Current Level for OFF delay time, the filter will shutdown automatic until the load current greater than Max. ON Current Level for ON Delay Time.
	ON Delay Time	The delay time for automatic start-up.
	OFF Delay Time	The delay time for automatic shutdown.
	Max. ON Current Level	The current level for automatic start-up.
	Min. OFF Current Level	The current level for automatic shutdown.
Auto Re-Start	Auto Re-Start	When this function is enabled, the filter is allowed to automatic re-start when some abnormal conditions return to normal. The abnormal conditions include system voltage abnormal, frequency error, etc
	Delay Time	The delay time for automatic re-start.



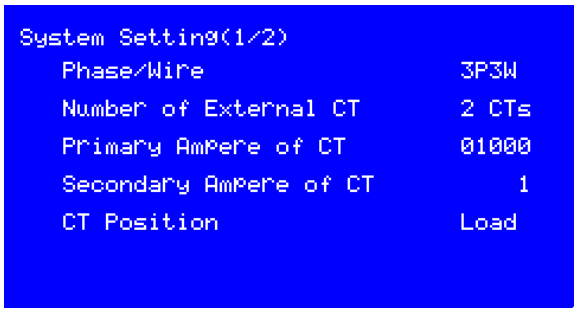
System Setting

1) Move the cursor to **System Setting** by using ▼ ▲ keys and then press ↵ key to enter into the **System Setting** page. The PureSine will prompt you for a password; just press ↵ to **DISPLAY** the settings.

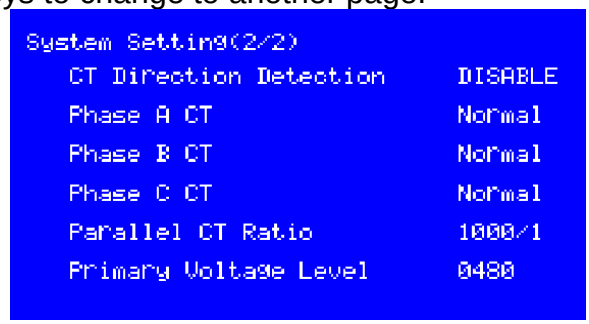


2) You may see the information when entering into the **System Setting** page and the detailed information as below:

Phase/Wire	For 3P3W power system only.
Number of External CT	Select 2 or 3 external CTs that will install at Source/Load side.
Primary Ampere of CT	Set the primary current rating of External CT.
Secondary Ampere of CT	Set the secondary current rating of External CT. The Control Module can accept 1A or 5A rating. 1A is standard. If 5A CT will be used, the optional MPSCTBD is needed.
CT Position	Select location where External CT should be installed.
CT Direction Detection	When this function is enabled, the filter will diagnose the polarity of External CT. When the polarity is incorrect, the filter will alarm and will not start-up.
Phase A CT	When the polarity of External CT is incorrect, set CT reversed can change CT polarity and don't need to reconnect the CT wires.
Phase B CT	
Phase C CT	
Parallel CT Ratio	Available Parallel CT ratio 500/1, 1000/1, 2000/1. When Control Modules operate in parallel, Parallel CT has to install.
Primary Voltage Level	The filter allows application in different voltage level with an external transformer that installs at the input side of the filter. When the external transformer is used, the voltage level should be set to primary voltage of the transformer.

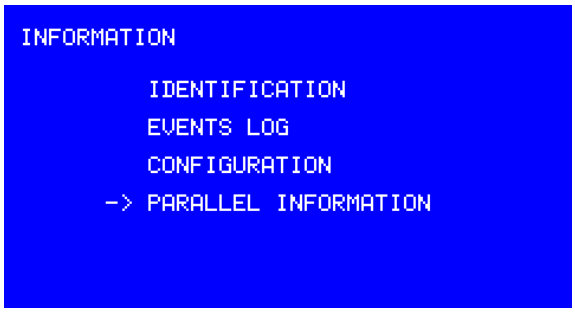


3) Use ▼ ▲ keys to change to another page.

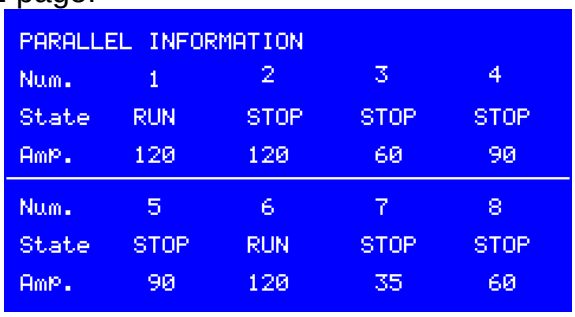


PARALLEL INFORMATION

1) Move the cursor to the **PARALLEL INFORMATION** by using ▼ ▲ keys and then press ↵ key to enter into the **PARALLEL INFORMATION** page.



2) You may see the information when entering into the **PARALLEL INFORMATION** page.

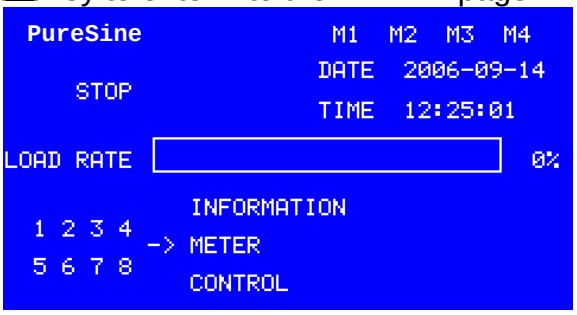


Num. **:** Indicate the number of parallel.
State **:** Indicate the state of the filter.
Amp. **:** Indicate the current Rating of the filter.

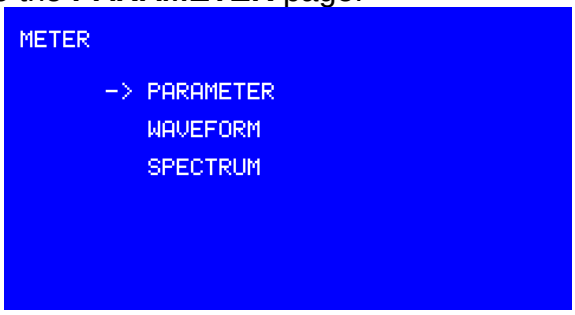
METER

PARAMETER

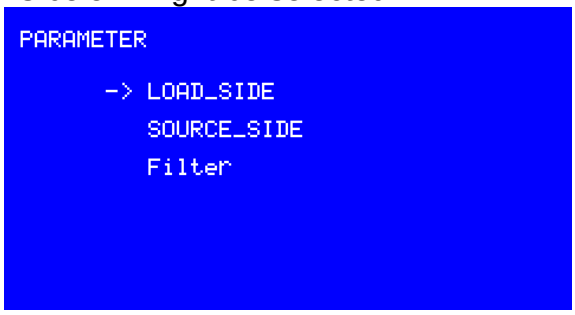
1) In the **Main** screen, move the cursor to the **METER** by using ▼ ▲ keys and then press ↵ key to enter into the **METER** page.



2) Move the cursor to **PARAMETER** by using ▼ ▲ keys and then press ↵ key to enter into the **PARAMETER** page.

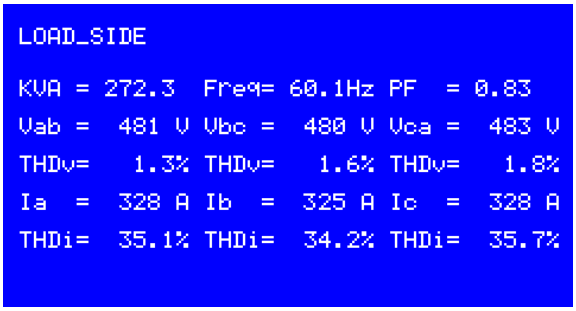


3) 3 different options below might be selected.

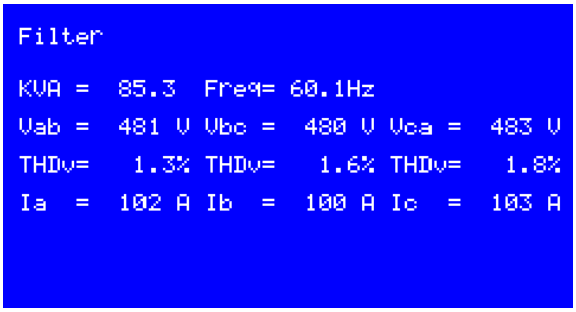


LOAD_SIDE : To show the power parameter of load.
SOURCE_SIDE : To show the power parameter of source.
Filter : To show the power parameter of filter.

4) **LOAD_SIDE** and **SOURCE_SIDE** page show below parameter.


LOAD_SIDE
KVA = 272.3 Freq= 60.1Hz PF = 0.83
Vab = 481 V Vbc = 480 V Vca = 483 V
THDv= 1.3% THDv= 1.6% THDv= 1.8%
Ia = 328 A Ib = 325 A Ic = 328 A
THDi= 35.1% THDi= 34.2% THDi= 35.7%

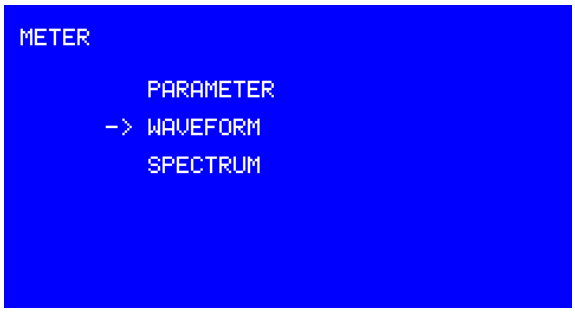
5) **Filter** page show below parameter.



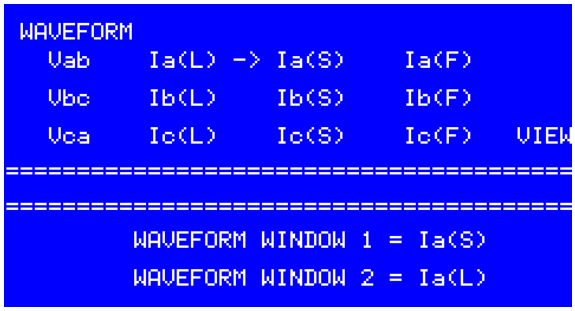
KVA	**:** Complex power
Freq	**:** System frequency
PF	**:** Power Factor
Vab ,Vbc, Vca	**:** Three phase line to line rms voltage
Ia, Ib, Ic	**:** Three phase line rms current
THDv	**:** Total harmonic voltage distortion
THDi	**:** Total harmonic current distortion

WAVEFORM

1) Move the cursor to the **WAVEFORM** by using ▼ ▲ keys and then press ↵ key to enter into the **WAVEFORM** page.

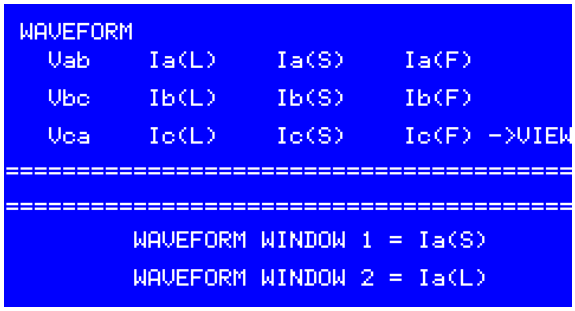


2) In the **WAVEFORM** page, use ◄ ► ▼ ▲ keys to move the cursor to the desire parameter you wish to view the waveform. You can choose up to 2 parameters for viewing. The waveform will be display on "**WAVEFORM WINDOW 1**" and "**WAVEFORM WINDOW 2**".

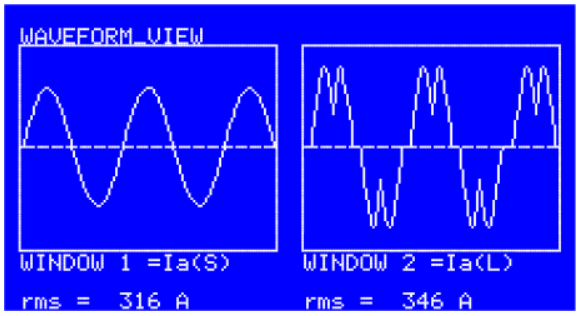


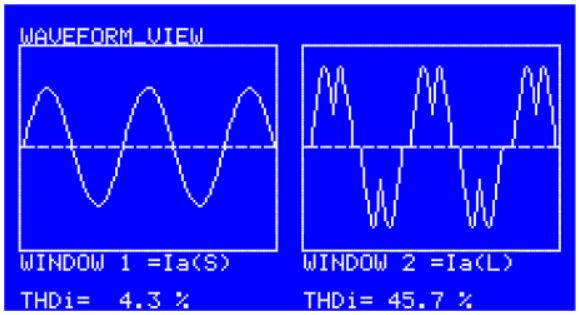
Vab, Vbc, Vca : Three phase line to line voltage.
Ia(L), Ib(L), Ic(L) : Three phase line current of load side.
Ia(S), Ib(S), Ic(S) : Three phase line current of source side.
Ia(F), Ib(F), Ic(F) : Three phase line current of filter side.

3) Once you have selected the desire parameter, move the cursor to "**VIEW**" and then press ↵ key.



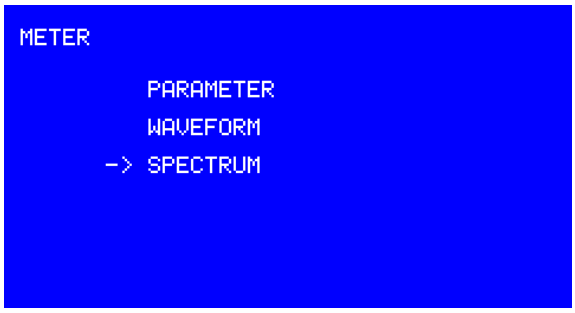
4) You can see two waveforms you selected in one screen simultaneously. Use ▼ ▲ keys to display rms or THD of the waveforms.



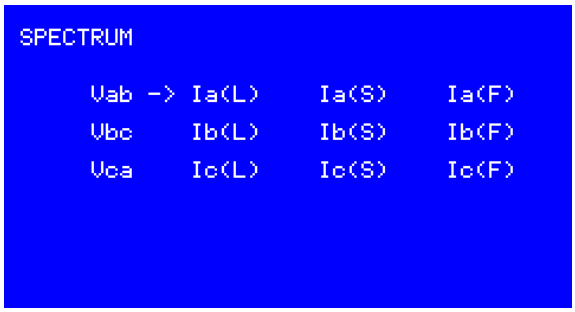


SEPCTRUM

1) Move the cursor to the **SPECTRUM** by using ▼ ▲ keys and then press ↵ key to enter into the **SPECTRUM** page.

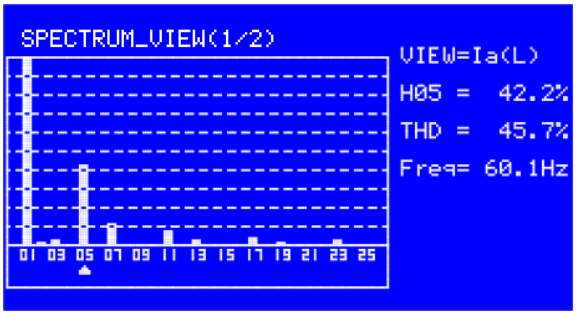


2) In the **SPECTRUM** page, use ◄ ► ▼ ▲ keys to move the cursor to the desire parameter you wish to view the spectrum and then press ↵ key to view the spectrum.



Vab, Vbc, Vca : Three phase line to line voltage.
Ia(L), Ib(L), Ic(L) : Three phase line current of load side.
Ia(S), Ib(S), Ic(S) : Three phase line current of source side.
Ia(F), Ib(F), Ic(F) : Three phase line current of filter side.

3) The page 1 shows the spectrum from 1st to 26th order. Use ◄ ► keys to move the cursor to the desire harmonic order you wish to view. Use ▼ ▲ keys to change to another page.



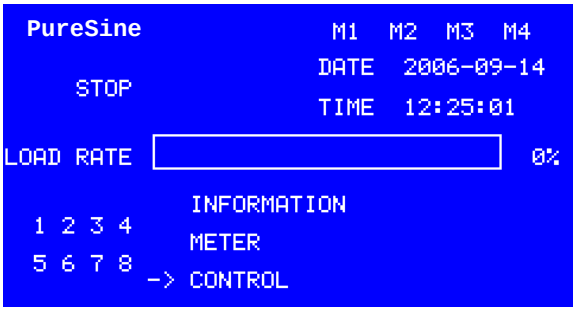
Hxx : The harmonic distortion for specific harmonic order.
THD : The total harmonic distortion.
Freq: System frequency

4) The page 2 shows the spectrum from 27th to 51st order.

CONTROL

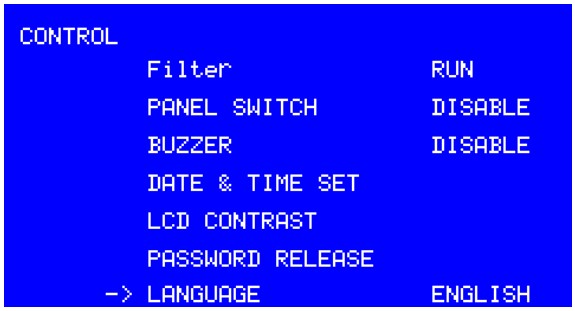
Go to CONTROL Menu

1) In **Main** screen, move the cursor to the **CONTROL** by using ▼ ▲ keys and press ↵ key to enter into the **CONTROL** page.



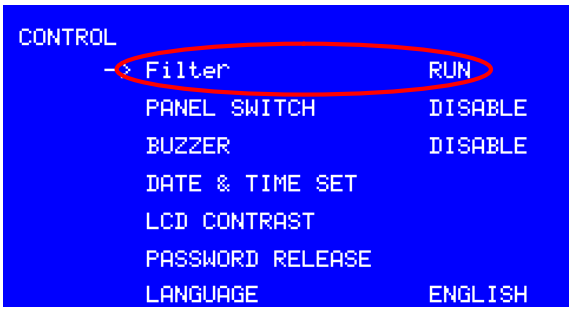
2) The system will ask for password before displaying the **CONTROL** page. To enter the password, use ▼ ▲ keys to select from 0~9 for each digit, and ◄ ► keys to move from the 1st digit to 4th digit. Use ↵ key to enter the password. Once password is confirm by the system, the **CONTROL** page will be displayed. The default password is "0000" and user can change the password. Please refer to section 3-4-7 to change the password.

3) The **CONTROL** page offer 7 function as below:



Filter RUN/STOP

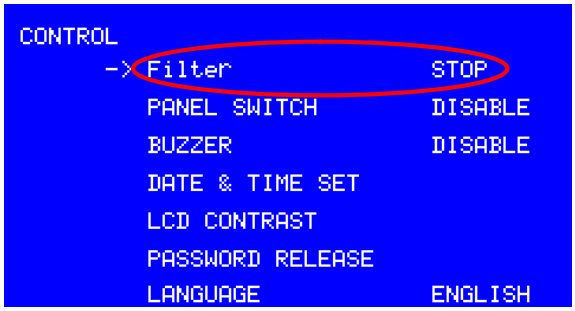
1) The **Filter** function provides a command for start-up or shutdown the filter. Move the cursor to the **Filter** by using ▼ ▲ keys and then press ↵ key to send a command to start-up or shutdown the filter.



Filter RUN is start-up command.
Filter STOP is shutdown command.
When the filter is filtering, **Filter STOP** is displayed**;** on the other hand, **Filter RUN** is displayed.

2) Press ↵ key to send a start-up command, a confirm screen will be displayed as below. Use ◄ ► keys to move the cursor to "YES" and then press ↵ key to start-up the filter.

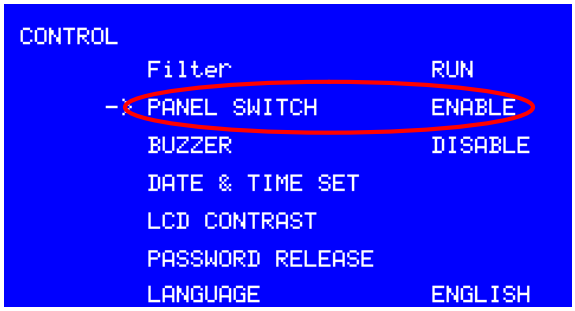
3) When the filter is turn on, the "**FILTERING"** LED indicator on the control panel will be lighted up and **Filter RUN** change to **Filter STOP**.



4) Press ↵ key to send a shutdown command, a confirm screen will be displayed as below. Use ◄ ► keys to move the cursor to "YES" and press ↵ key to shutdown the filter.

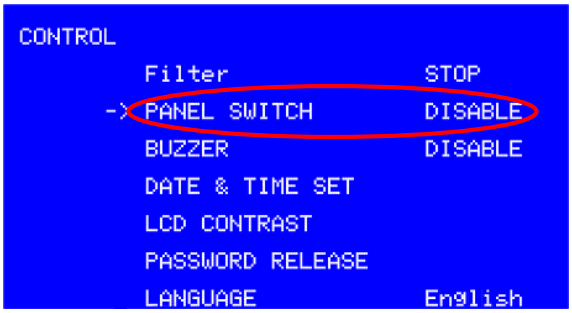
PANEL SWITCH ENABLE/DISABLE

1) The **PANEL SWITCH** provides a command to Enable/Disable the ON/OFF keypad on the control panel. Use ▼ ▲ keys to move the cursor to the **PANEL SWITCH** and then press ↵ key for Enable/Disable the ON/OFF keypad.



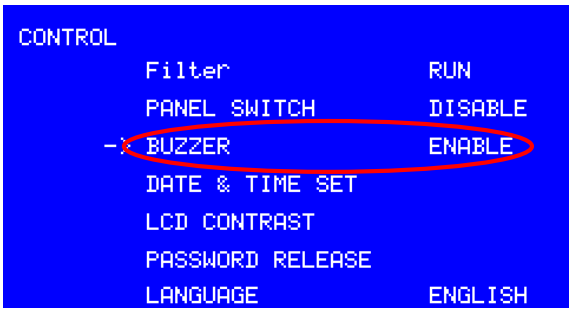
When **PANEL SWITCH ENABLE** is displayed, the ON/OFF key on the keypad is disabled.

2) When the **PANEL SWITCH DISABLE** is displayed, it means ON/OFF key on the keypad is enabled and user can start-up or shutdown the filter by the ON/OFF key on the keypad.



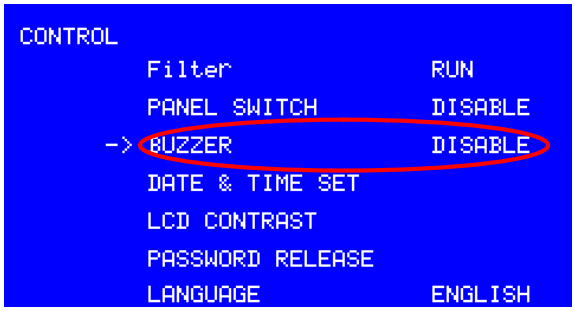
BUZZER ENABLER/DISABLER

1) The **BUZZER** provides a command to Enable/Disable the buzzer. Use ▼ ▲ keys to move the cursor to the **BUZZER** and then press ↵ key for Enable/Disable the buzzer.



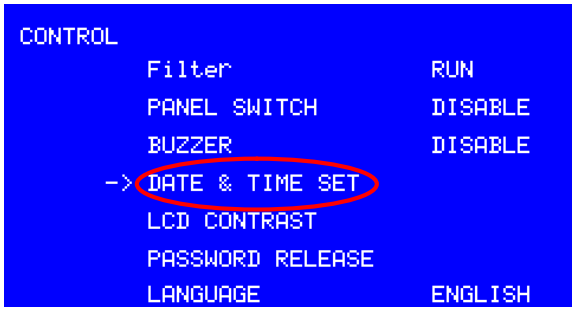
BUZZER ENABLE is a command to disable the buzzer.
BUZZER DISABLE is a command to enable the buzzer.

2) When the **BUZZER DISABLE** is displayed, it means the buzzer will alarm if abnormal condition is happen. On the other hand, the buzzer will be silent.

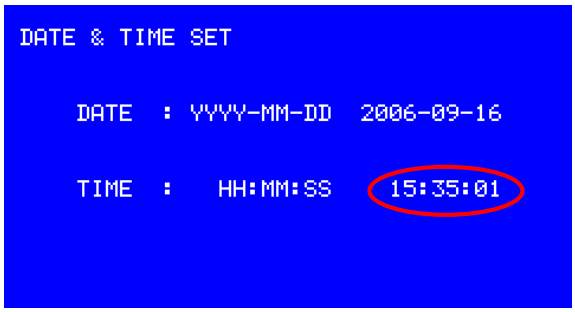


DATE & TIME SET

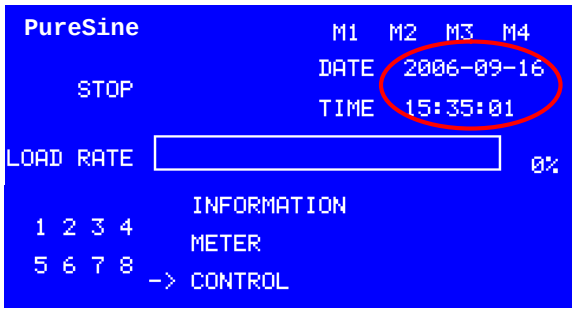
1) Use ▼ ▲ keys to move the cursor to **DATE & TIME SET** and then press ↵ key for set the current date and time.



2) In the **DATE & TIME SET** page**,** use ◄ ► keys to move the cursor to desire field and then use ▼ ▲ keys to change the desire date and time. Press ↵ to save the final setting.



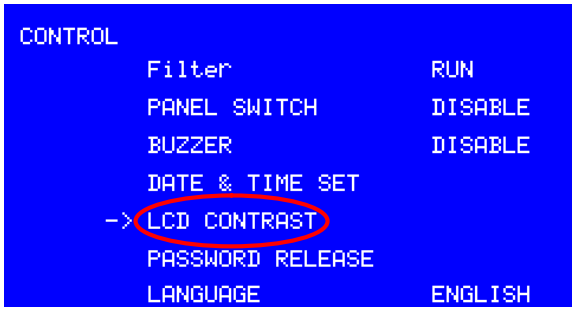
3) Now, the date and time have been changed.



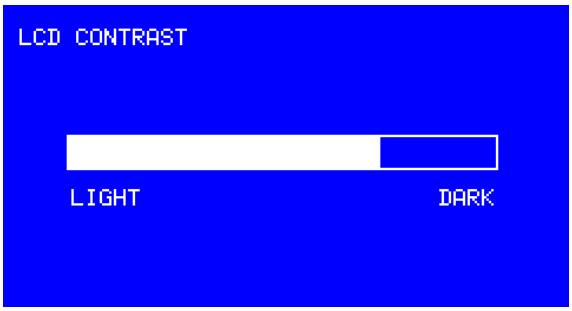
Note: The current date and time will be lost and reset to the initial conditions (2000-00-00 00:00:00), when the filter is disconnected with power utility for 168 hours (7 days). This change shall not affect the stored parameter on the control panel.

LCD CONTRAST

1) Use ▼ ▲ keys to move the cursor to the **LCD CONTRAST** and then press ↵ key to adjust contrast of LCD display.

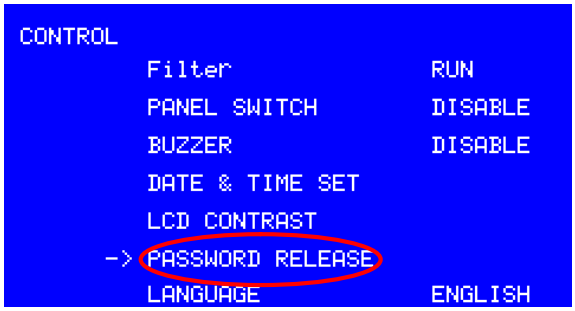


2) Use ◄ ► key to adjust contrast of LCD display.

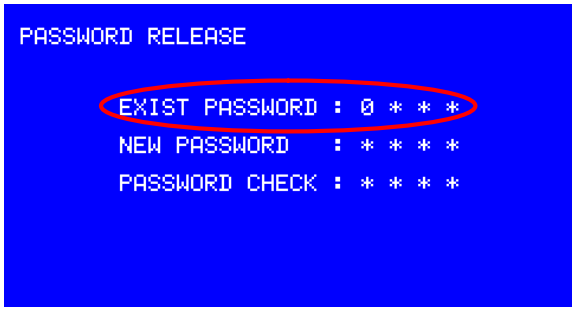


PASSWORD RELEASE

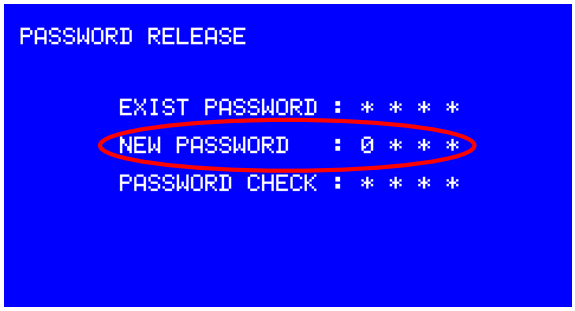
1) Use ▼ ▲ key to move the cursor to the **PASSWORD RELEASE** and then press ↵ key for change the password.



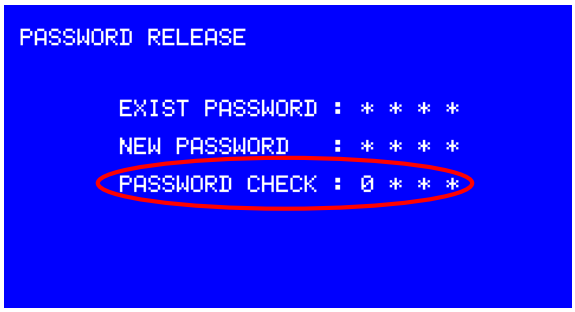
2) First, enter the exist password. Use ▼ ▲ keys to select from 0~9 for each digit, and ◄ ► keys to move from the 1st digit to 4th digit. Use ↵ key to enter the password.



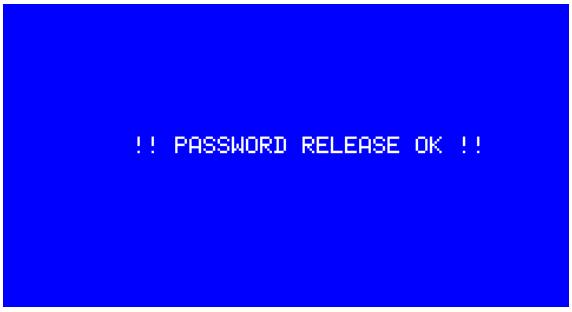
3) Second, enter the new passowrd and then press ↵ key.



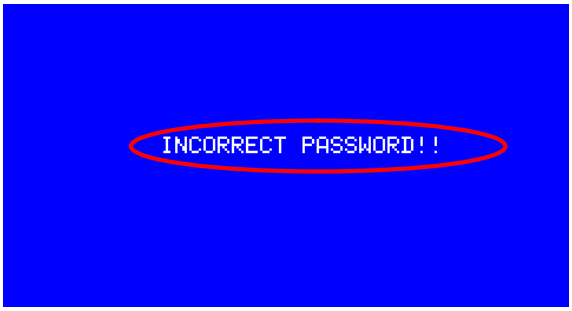
4) Third, enter the new password again and then press ↵ key.



5) Now, the password has been changed.

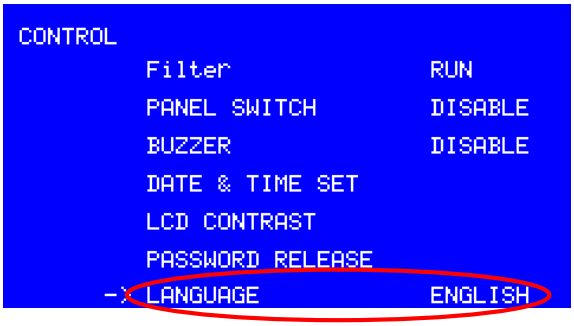


6) If the password is incorrect, a warning will show on the screen. Please follow the procedure of this section to change the password again.



Language

1) Use ▼ ▲ keys to move the cursor to the **Language** and then press ↵ key to change the language that show on the LCD display.



4. Installation and Wiring

Installation Environment

1. **Matrix PureSine** is an electronic control device; the installation environment impacts its operational reliability and lifespan. The filter is equipped with cooling fans to reduce the heat generated during operation. Therefore, do not block ventilation openings during installation and operation.

2. Do not install the filter in any of the following environments: Dusty, humid, corrosive, or high vibration. It is strongly recommended to install the filter in a clean and dust-free room with controlled temperature at 55°F to 77°F / 15°C to 25°C.

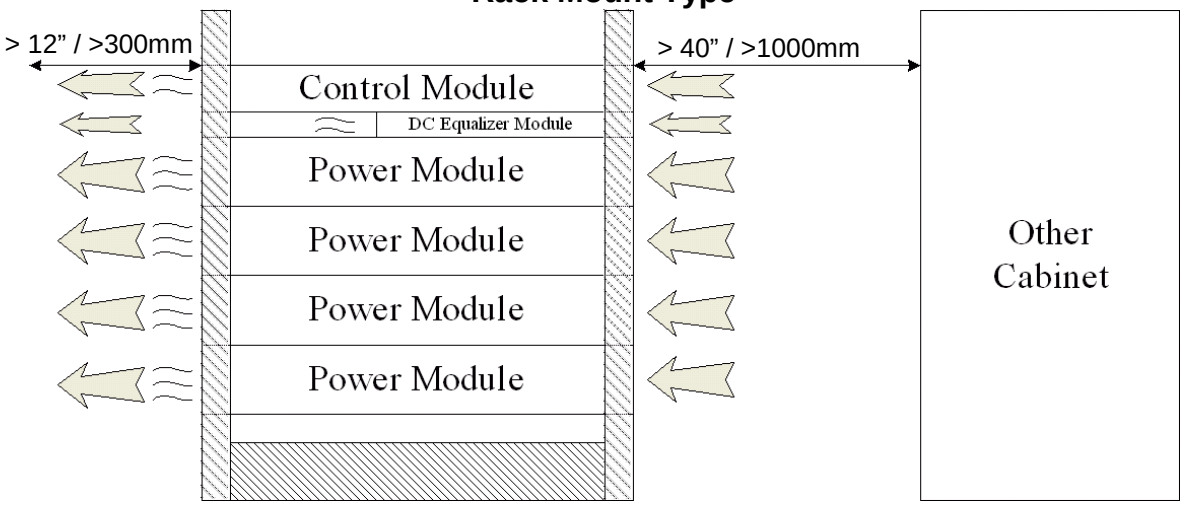
General Requirement for Ventilation & Maintenance

Rack Mount type[1]

During installation, make sure to maintain the following:

1. Keep at least 12" / 300mm clearance behind the filter to ensure proper air-flow, as illustrated below.
2. Make sure a cooling fan is installed in the top of the rack cabinet to reduce the heat generated from the filter itself.
3. Keep at least 40" / 1000mm clearance in front of the filter for filter operation and future product maintenance.

Rack Mount Type



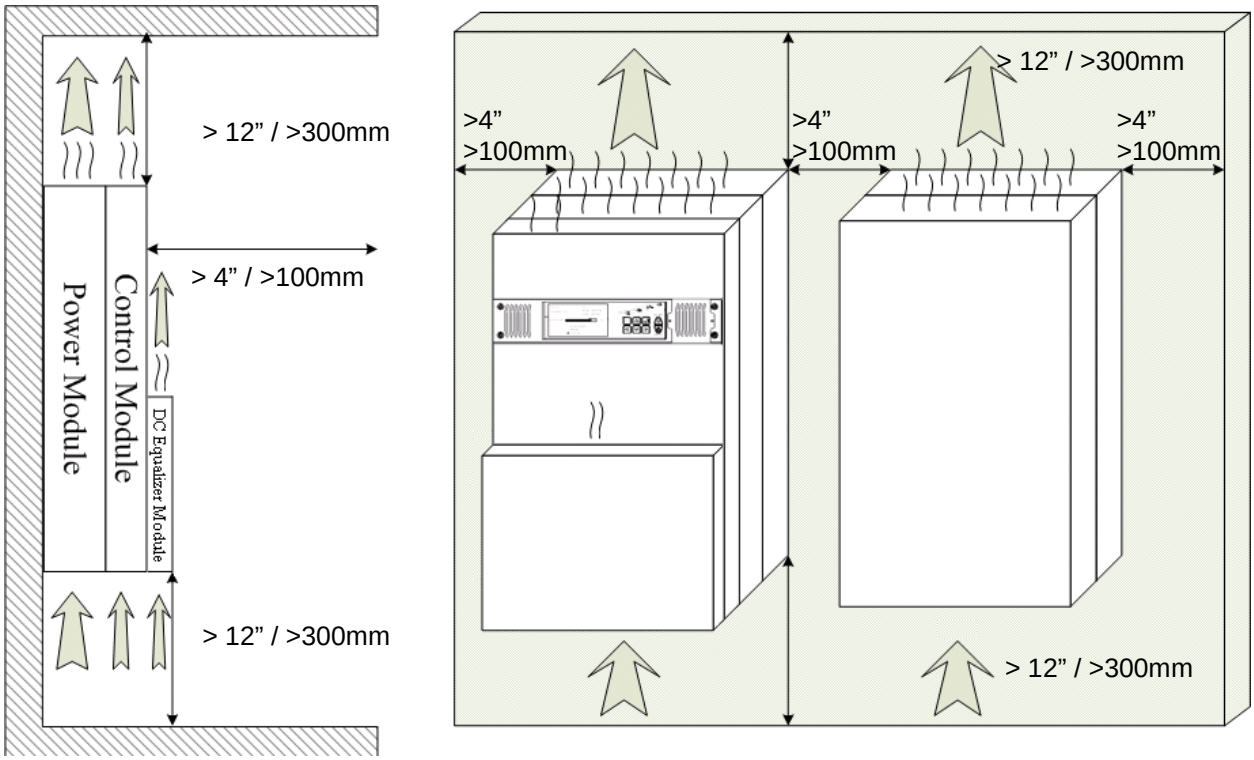
[1]Note: Consult factory regarding Rack Mount filters

Wall Mount Type

During installation, make sure to maintain the following:

1. Keep at least 12" / 300mm air-flow space for both the top and bottom of the filter to ensure proper air-flow. Do not block the air-flow of the filter.
2. Keep at least 24" / 600mm space from the front of the filter for product maintenance access. It is recommended to have a minimum of 4" / 100mm space from the front of the filter during operation.
3. Maintain at least 4" / 100mm spacing between filters.
4. When more than two (2) power modules are needed with a control module, the length of the power module control cables require a minimum installed spacing of 4" / 100mm and a maximum spacing of 17" / 431 mm.

Wall Mount Type

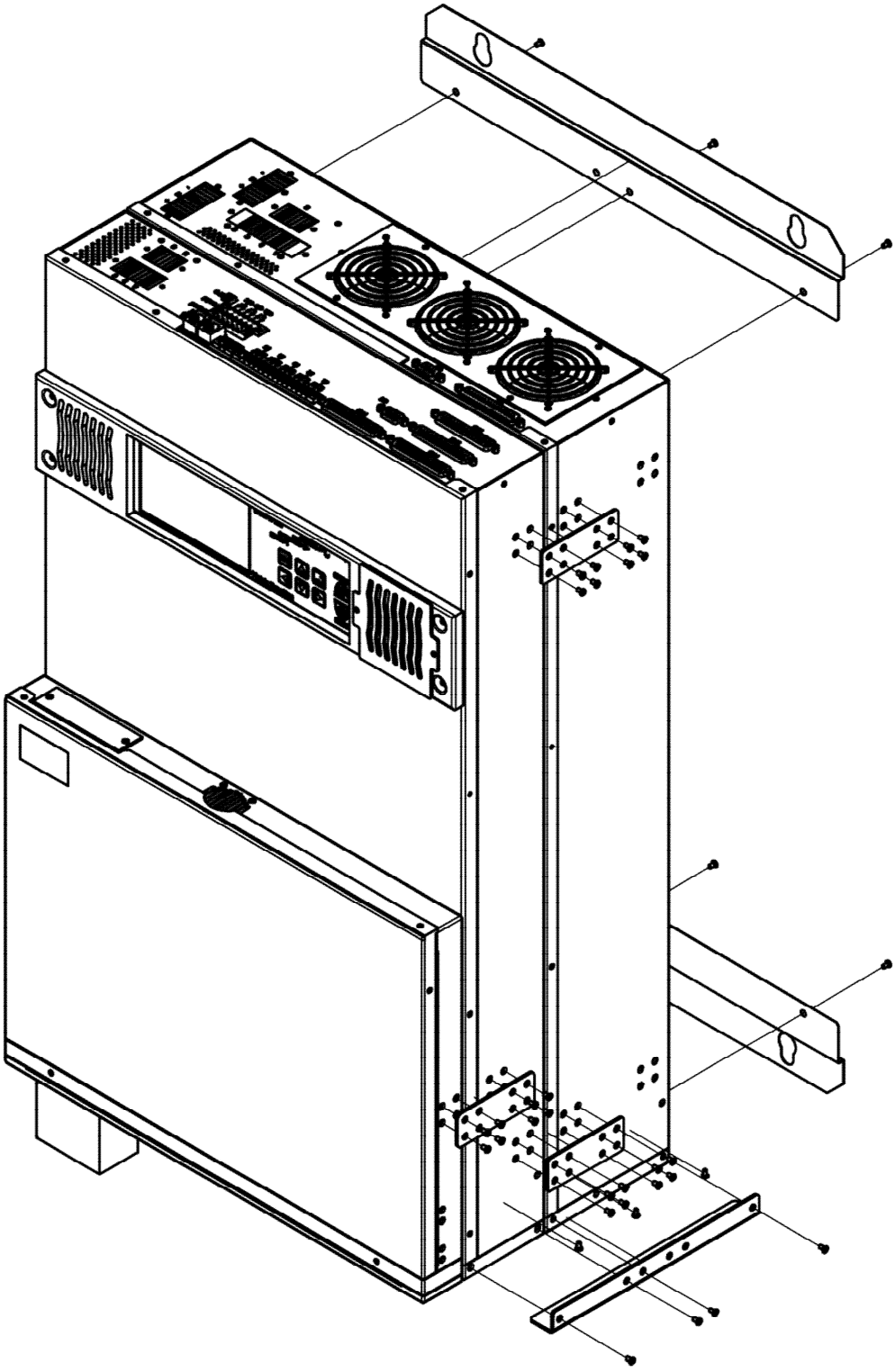


NOTE: If more than two (2) power modules are needed with a control module, as shown above, the additional power modules must be installed using an additional wall mount kit. (MTE Part Number: MPSWMK)

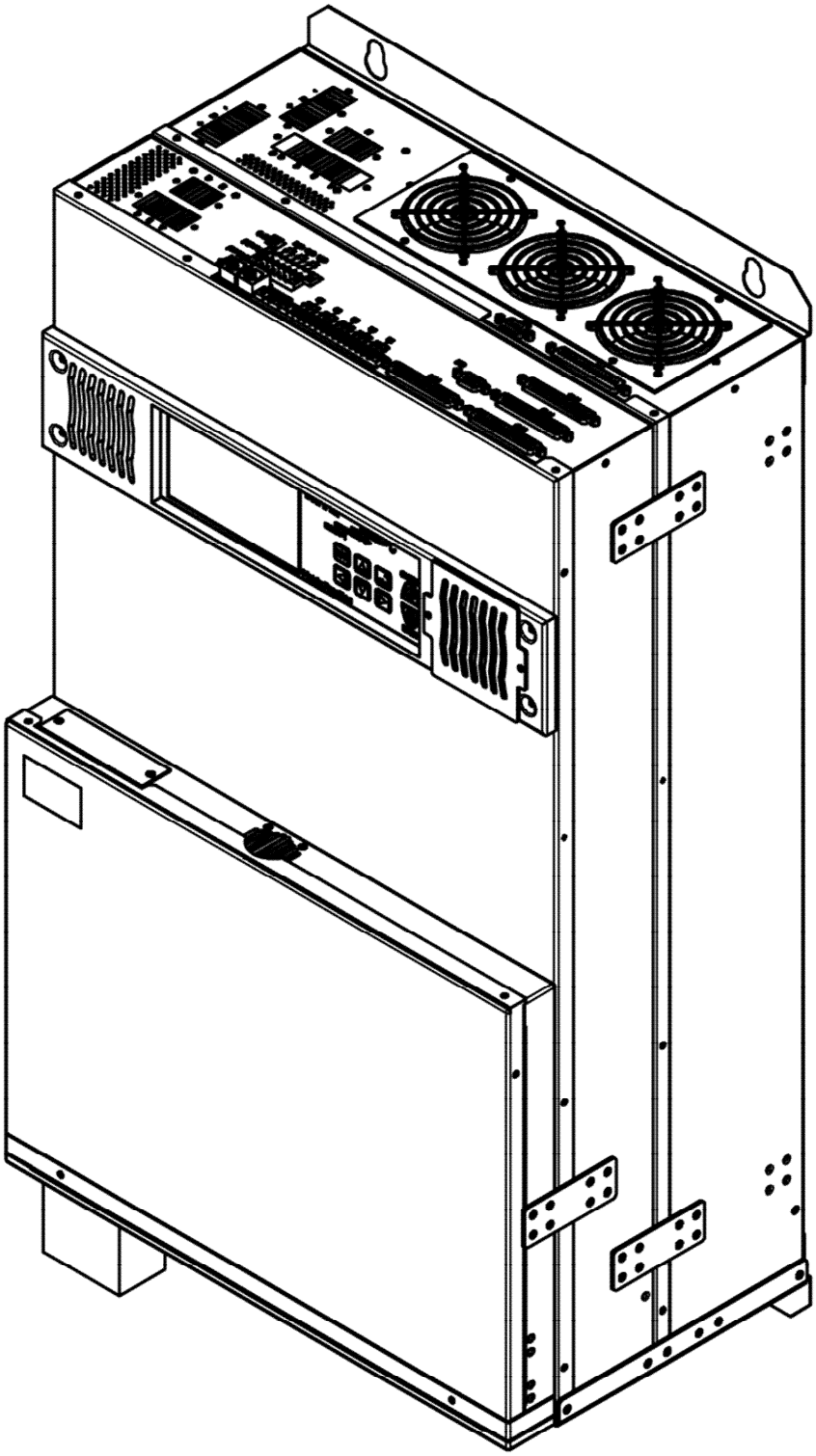
Installation

Wall Mount Installation

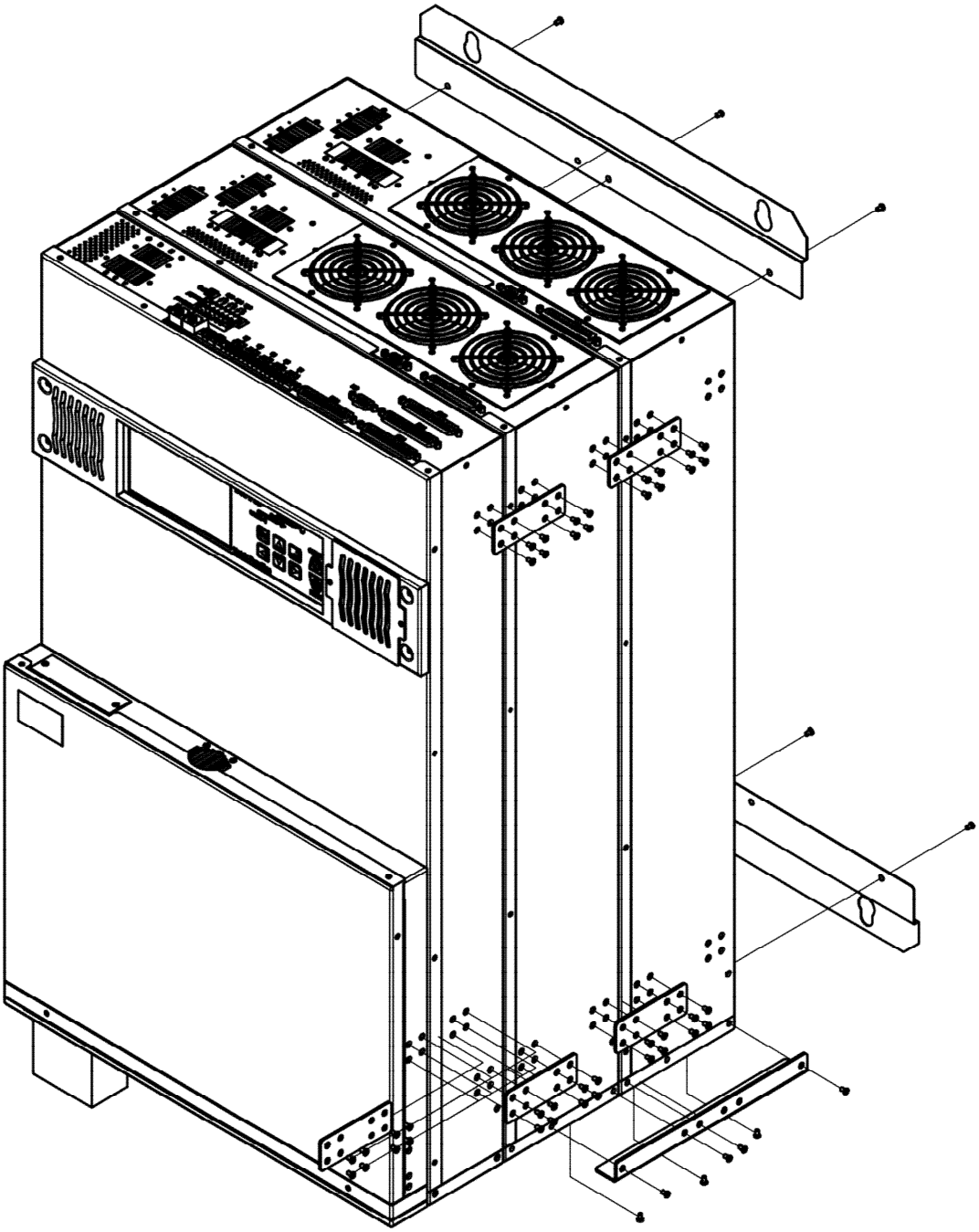
Exploded View - One Control Module and One Power Module



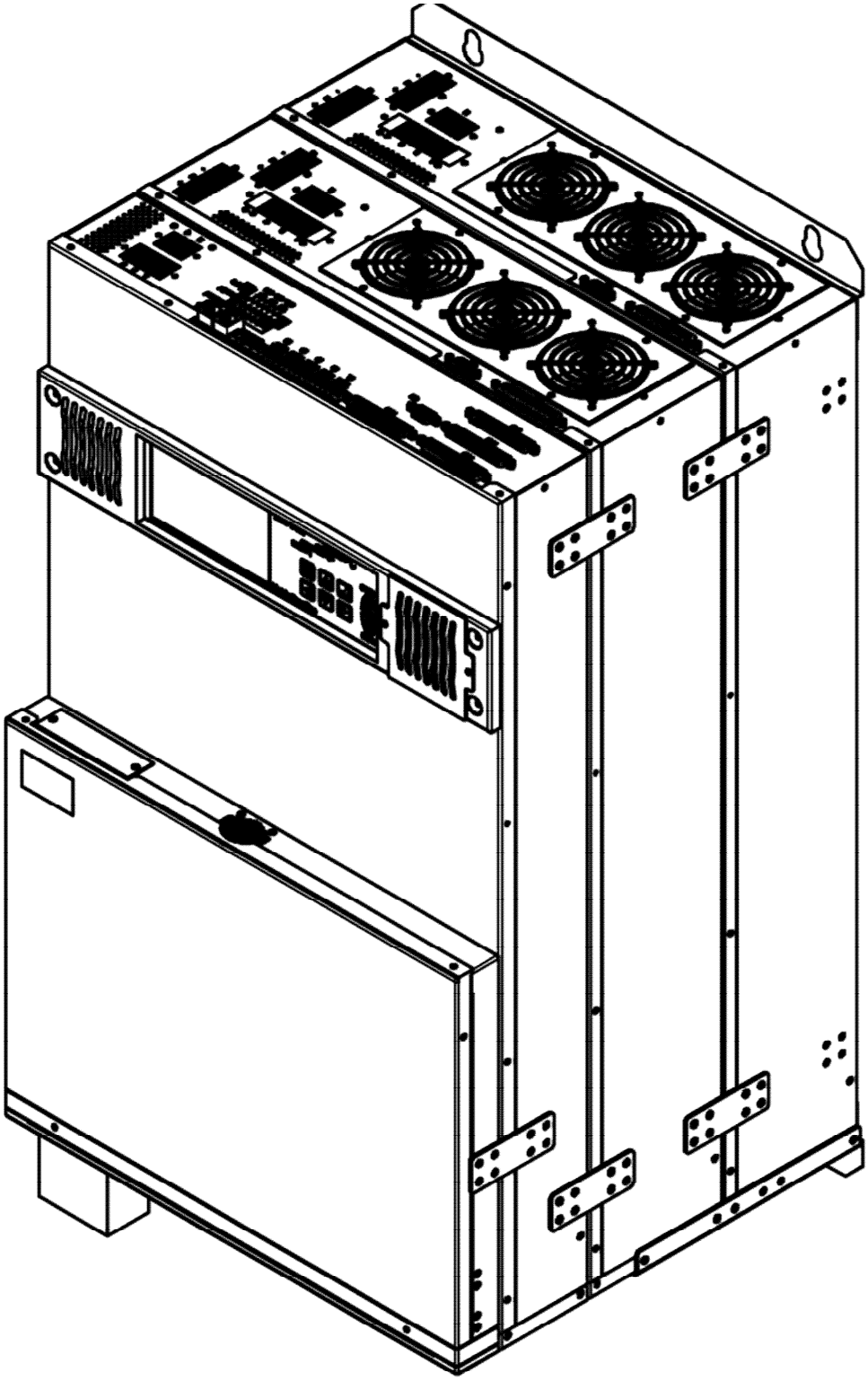
Completed View - One Control Module and One Power Module



Exploded View - One Control Module and Two Power Modules

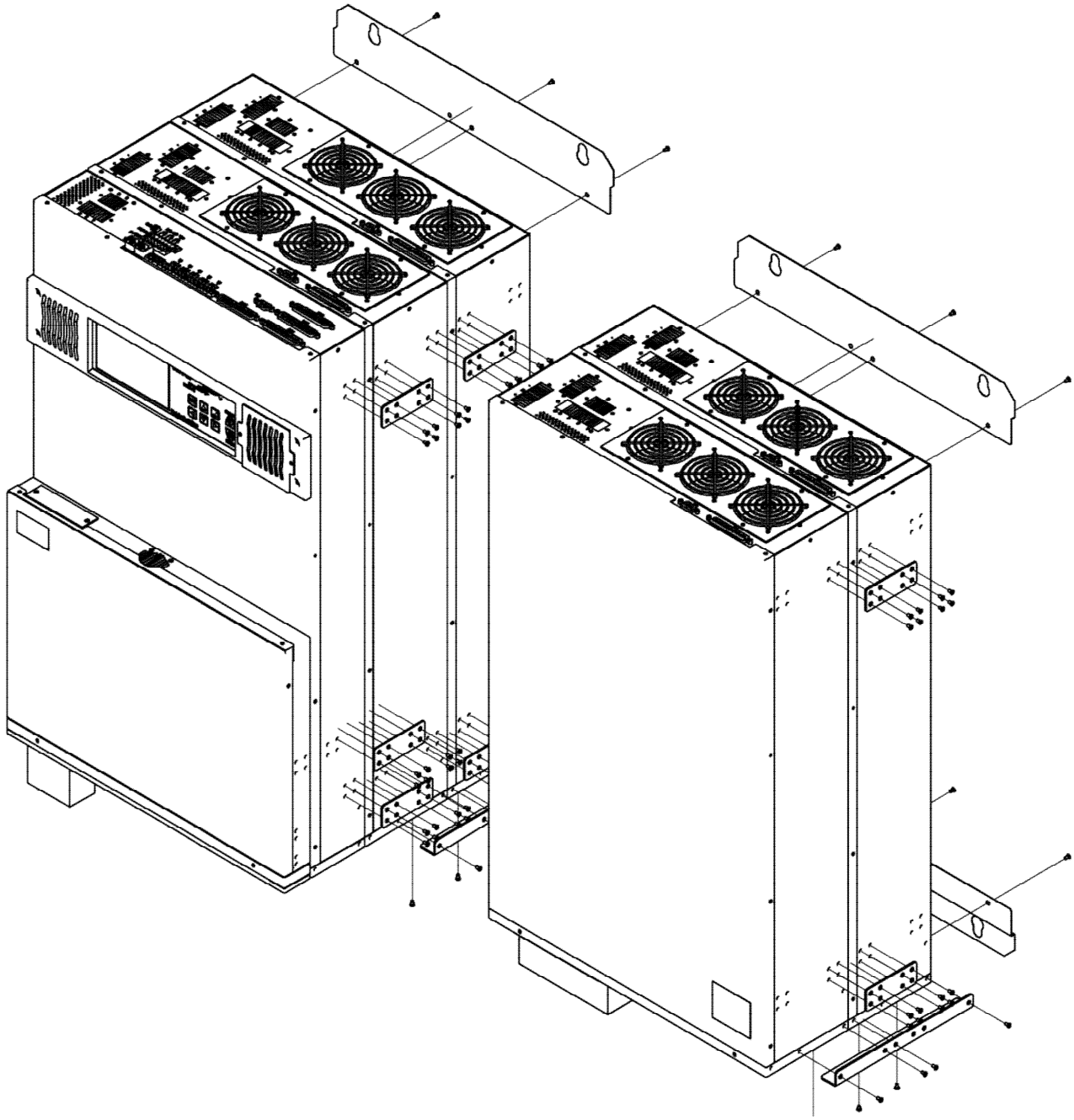


Completed View - One Control Module and Two Power Modules



Exploded View - One Control Module and Four Power Modules

NOTE: When more than two (2) power modules are needed with a control module, as shown below, the additional power modules must be installed using an additional wall mount kit. (MTE Part Number: MPSWMK)



Wiring & Cabling Explanation

The ***Matrix*** **PureSine** is comprised of a Control Module and one or more Power Modules: Wire connections described below:

Wire connection for Control Module

Control Module wiring:

1. (3) Power cables (A – Phase 1, B – Phase 2, C – Phase 3)
2. (1) Ground cable (G – Ground)
3. (4 or 6) External CT wires connect to the External terminal block of the filter. (**N =** Number of Control Modules that are operating in parallel). When **N** Control Modules operate in parallel, 2**N** or 3**N** additional wires are needed to connect between Control Modules.
4. 3(**N**+1) Parallel CT wires connect to the Parallel terminal block of the filter.
5. (1) 9-pin control signal cable that connects to the Master Power Module. This cable is shipped with the Control Module unit.
6. **N**+1 RJ11 parallel cable.

The ***Matrix*** **PureSine** is applied to 3 Phase 3 Wire systems. The External CTs can be installed on Source side or Load Side as indicated in Fig. 4-1 to 4-4. For proper cabling position, please refer to section: Parallel Communication Ports.

To obtain the best performance, it is recommended to install (3) External CTs on the Source side. If the external CTs must be installed on Load side, please contact a local authorized service agent.

To avoid possibility of interference with the CT output signal, do not place power cables and the CT twisted paired signal cable in the same tray or conduit. If both power & signal cables need to be in the same tray or conduit, ensure proper isolation between them.

The appropriate rating of Power Cables and Over-Current Protection Devices required for use with ***Matrix*** must adhere to local electrical regulations and the technical descriptions provided by the original equipment manufacturer. In addition, a minimum 10% over sizing to the Power Cables size and Over-Current Protection Devices is recommended, due to "skin effect" caused by the compensating harmonics generated by the ***Matrix***.

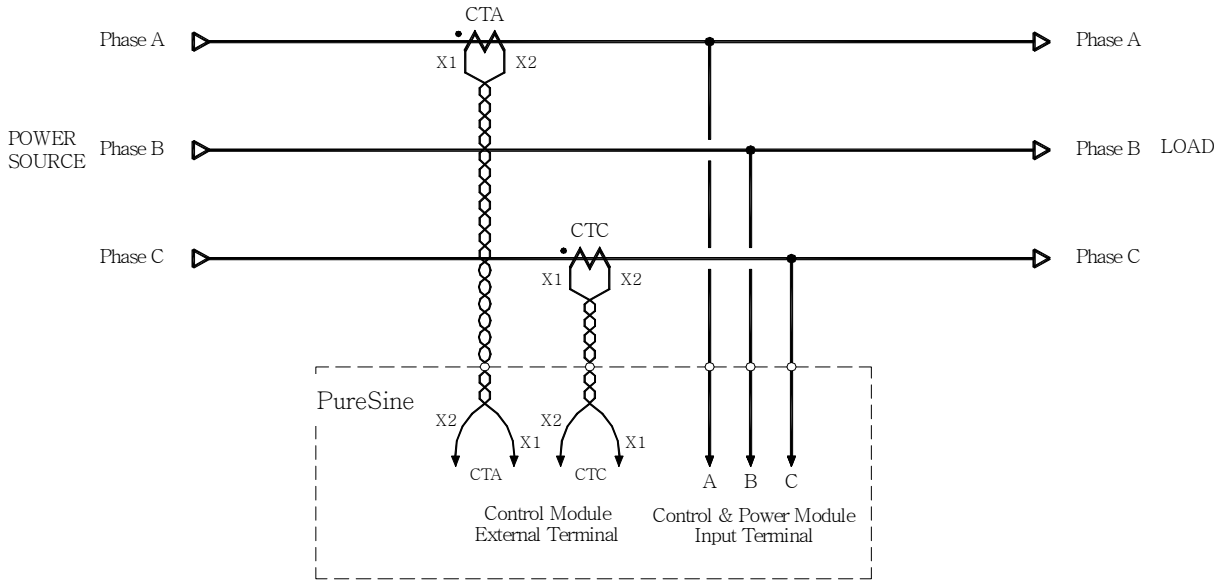


Fig. 4-1 (2) External CTs Installed at Source Side Diagram

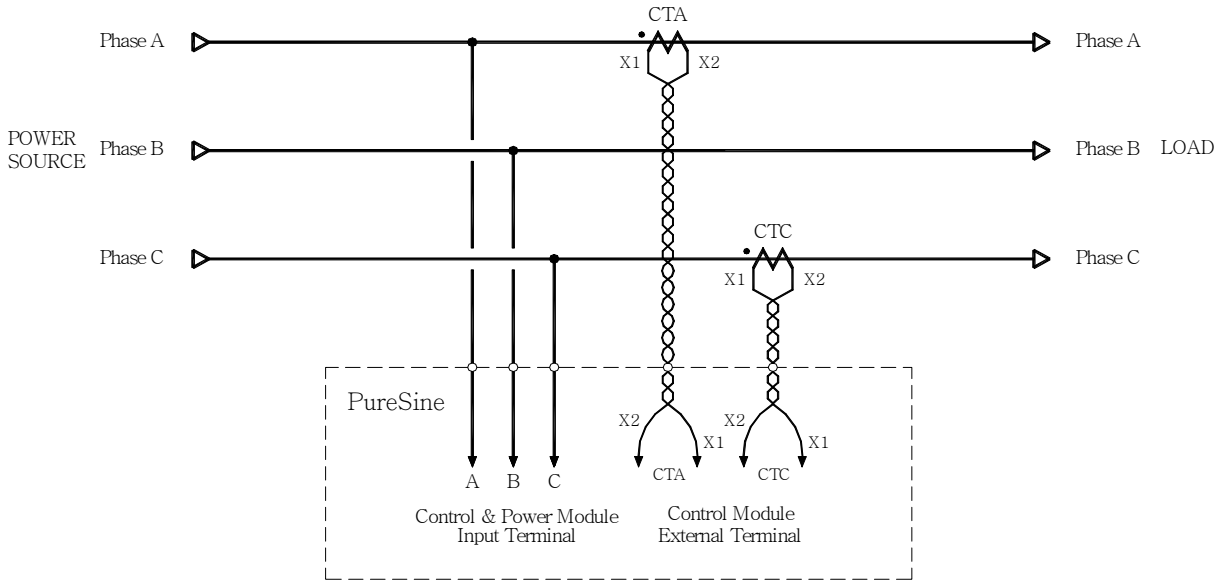


Fig. 4-2 (2) External CTs Installed at Load Side Diagram

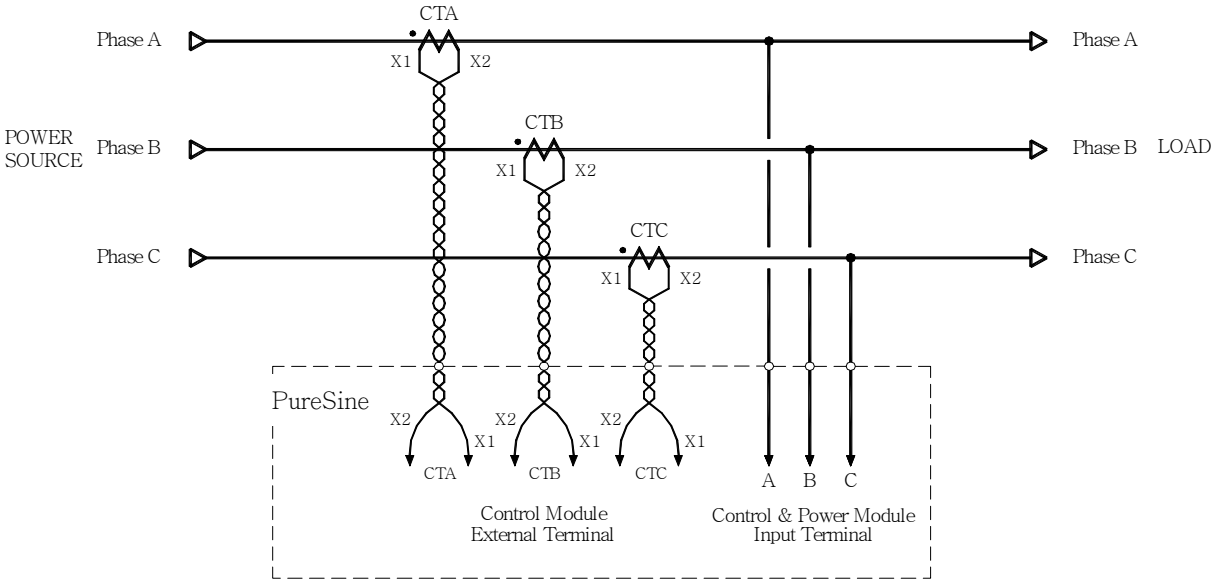


Fig. 4-3 (3) External CTs Installed at Source Side Diagram

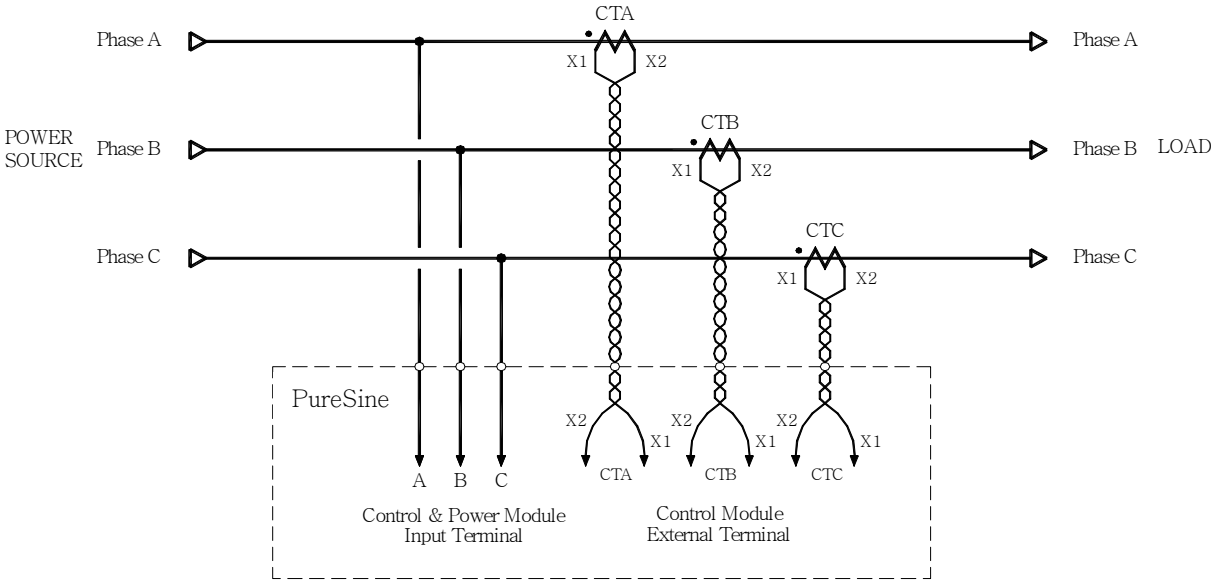


Fig. 4-4 (3) External CTs Installed at Load Side Diagram

When the Control Modules are installed in parallel, the RJ11 cable shall be connected according to Fig. 2-14. In addition, the wiring of the External CTs is different from a standalone unit. Each CT's output signals must be connected to the external terminal block of the Control Modules in series as shown in Fig. 4-5.

When using 3 CT's in Control Modules parallel all CT's must be connected in series. Please refer to Fig. 4-6 for Parallel Control Module CT connection.

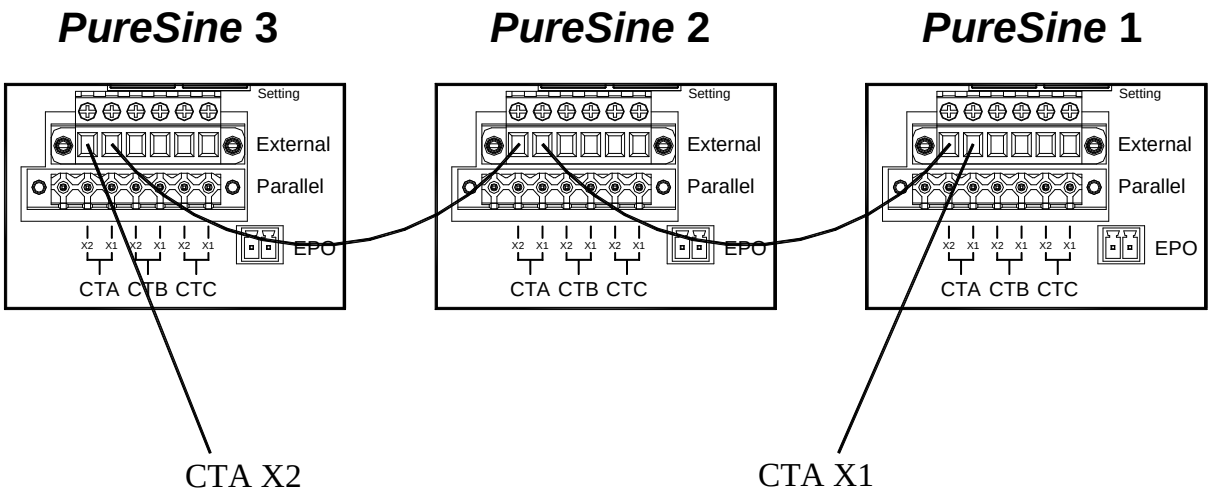


Fig. 4-5 The External CT connection for Control Modules operate in parallel

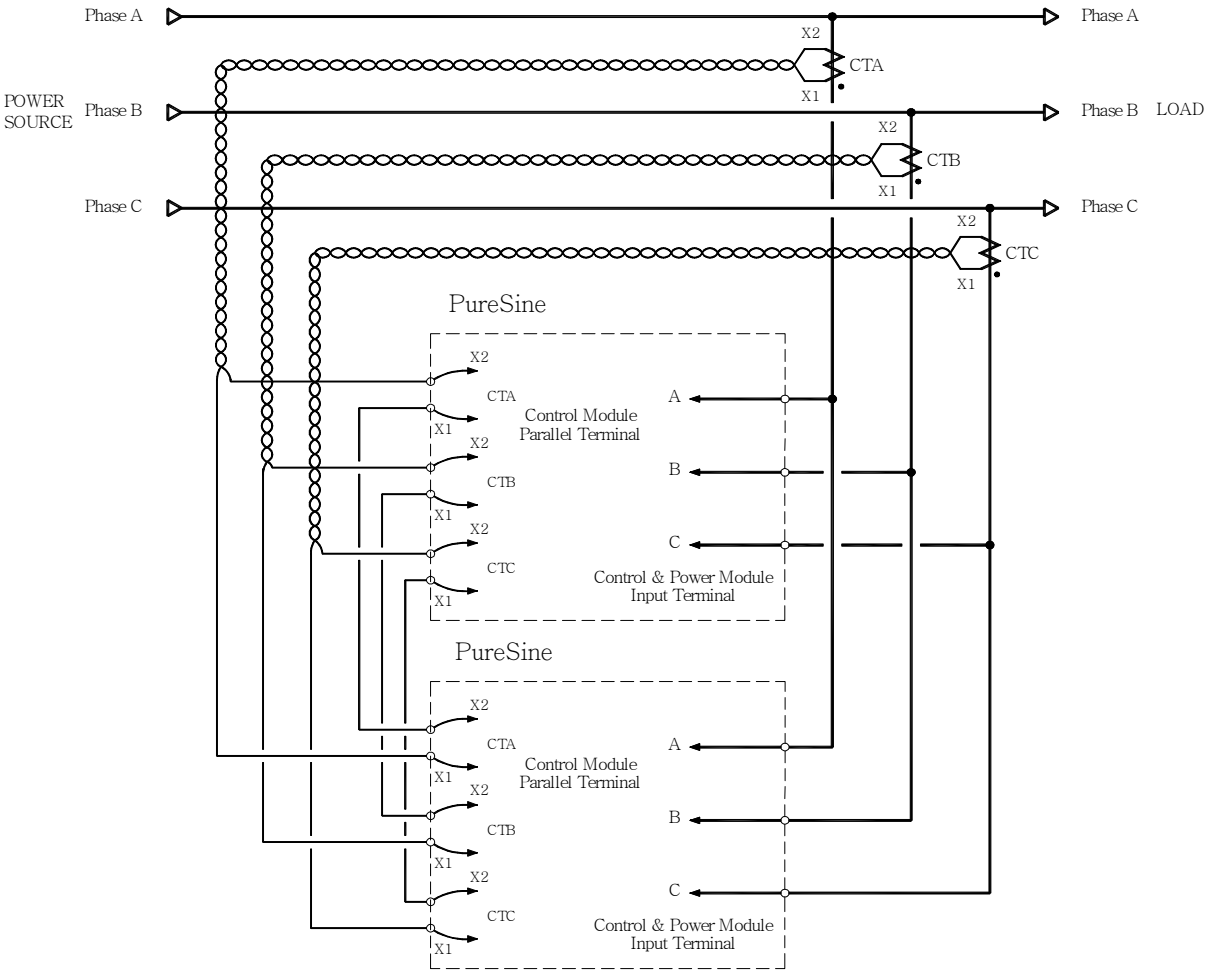


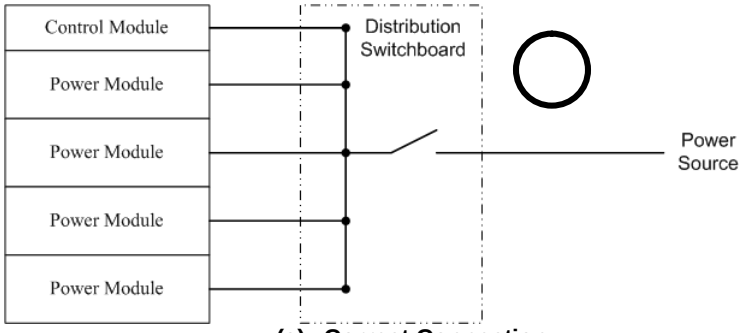
Fig. 4-6 Parallel CT Installation Diagram

Wire connection for Power Modules

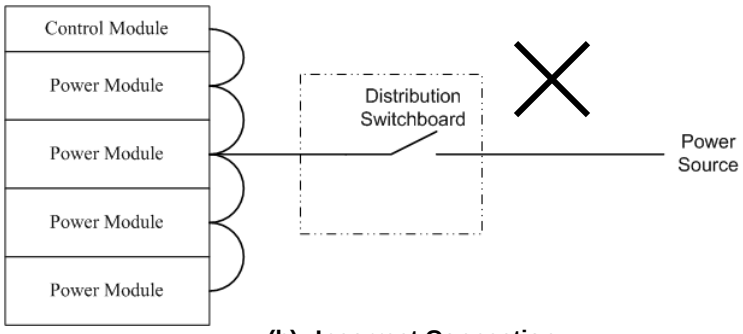
Power Module wiring:

1. (3) Power cables (A – Phase 1, B – Phase 2, C – Phase 3)
2. (1) Ground Cable (G – Ground)
3. (1) DC bus cable for connection to another Power Module. This cable ships with the Power Module.
4. (1) 37pin control signal cable for connection to the Control Module. This cable ships with the Power Module.

When several Power Modules are connected, the cables (Item 1 to Item 3) for each Power Module must be connected to the Distribution switchbox respectively as Fig. 4-7(a).



(a) Correct Connection



(b) Incorrect Connection

Fig. 4-7 Cables connection for Power Modules

WARNING

The Control Module can control and monitor up to 4 Power Modules. When more than 1 Power Module is connected, make sure that the DC Bus voltage of each Power Module is the same. The DC Bus of the Power Modules must be connected in parallel. If the DC Bus of the Power Modules is not connected properly, erroneous operation of the Power Modules may occur damaging the Power Modules. Refer to DC Bus Terminal regarding the correct connection of the DC Bus.

Wiring/Cabling Position and Specifications

		Recommended Minimum Cables Size	Terminal Block Specification	Recommended Maximum Length
Control Module	Power Cables, A, B, C	20AWG/0.5mm^2	Fastening with screw, M4	66 Feet / 20m
	CT Signal Wires	20AWG/0.5mm^2	Crimping , maximum 4mm^2	99 Feet / 30m
	Dry Contact Wires	24AWG/0.2mm^2	Crimping , maximum 4mm^2	99 Feet / 30m
	EPO Signal Wire	24AWG/0.2mm^2	Crimping , maximum 1.5mm^2	99 Feet / 30m
Power Module	Power Cables A, B, C	8AWG/6mm^2	Fastening with screw, M6	66 Feet / 20m

The Wire connections for the Control Module and Power Module are shown in Fig. 4-8 and Fig. 4-9.

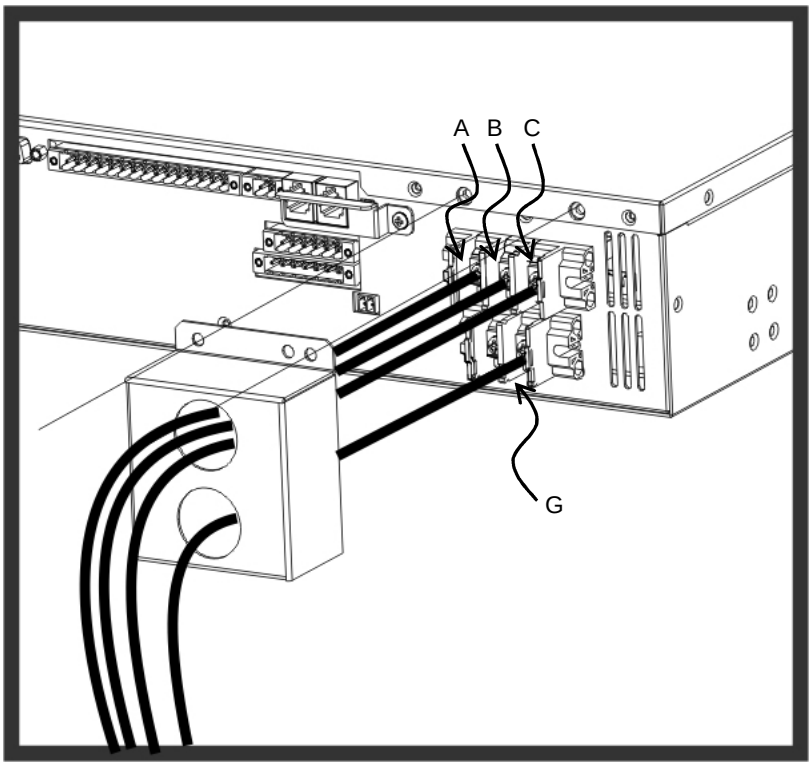


Fig.4-8 Control Module Wires Connection

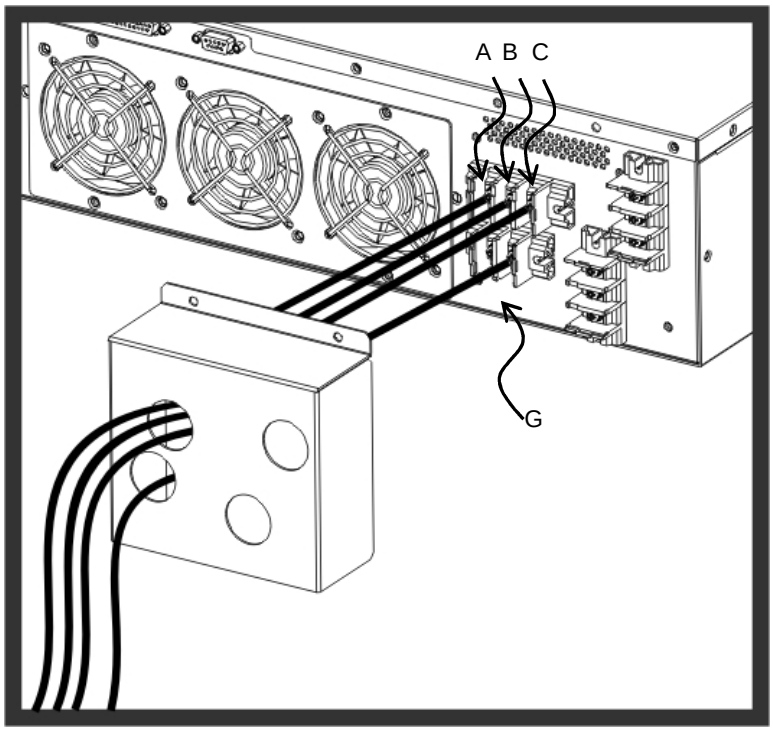


Fig.4-9 Power Module Wire Connection

PureSine Dimensions

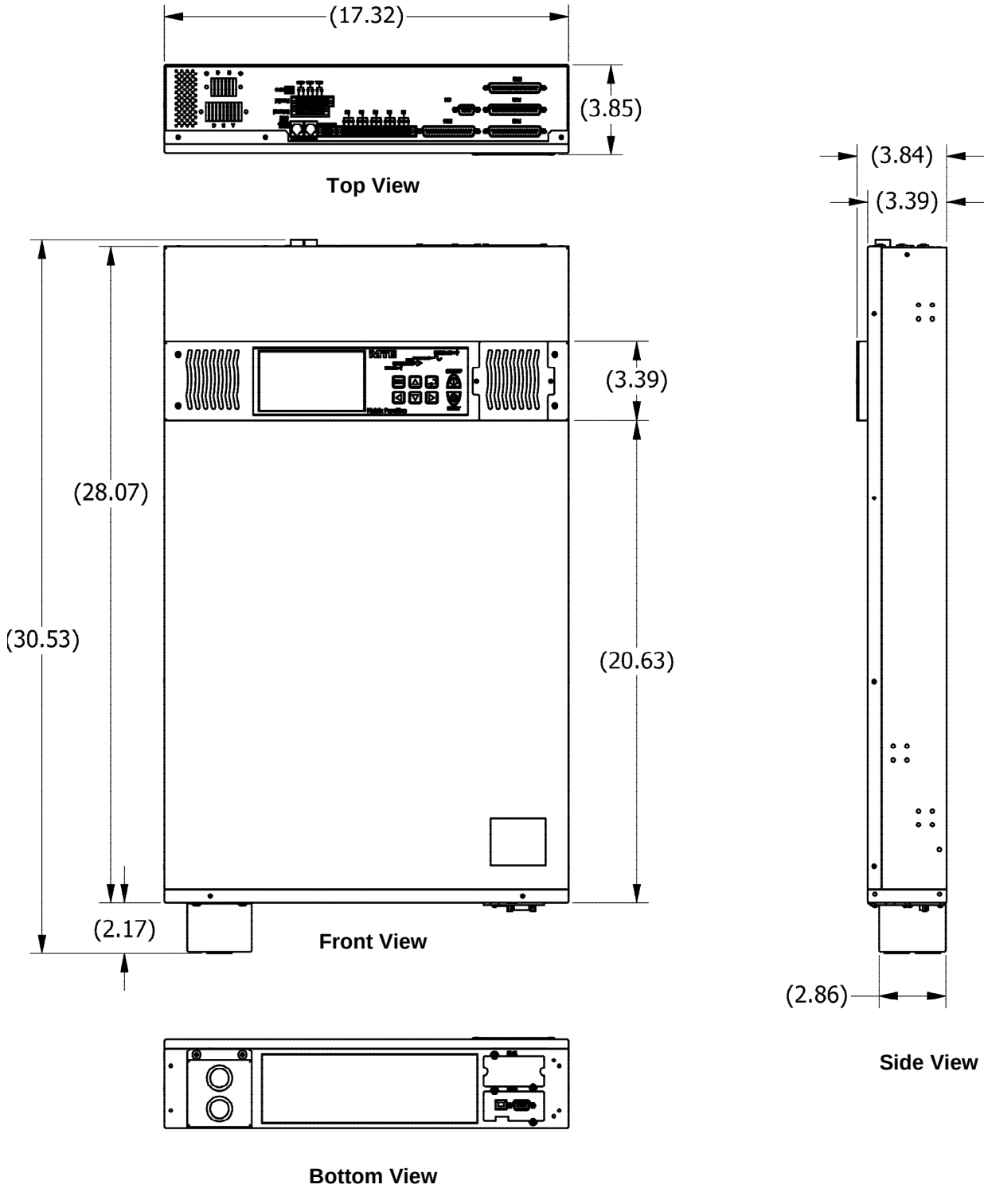


Fig. 4-10 LCD Control Module PureSine (MPSPCCD) Dimensions

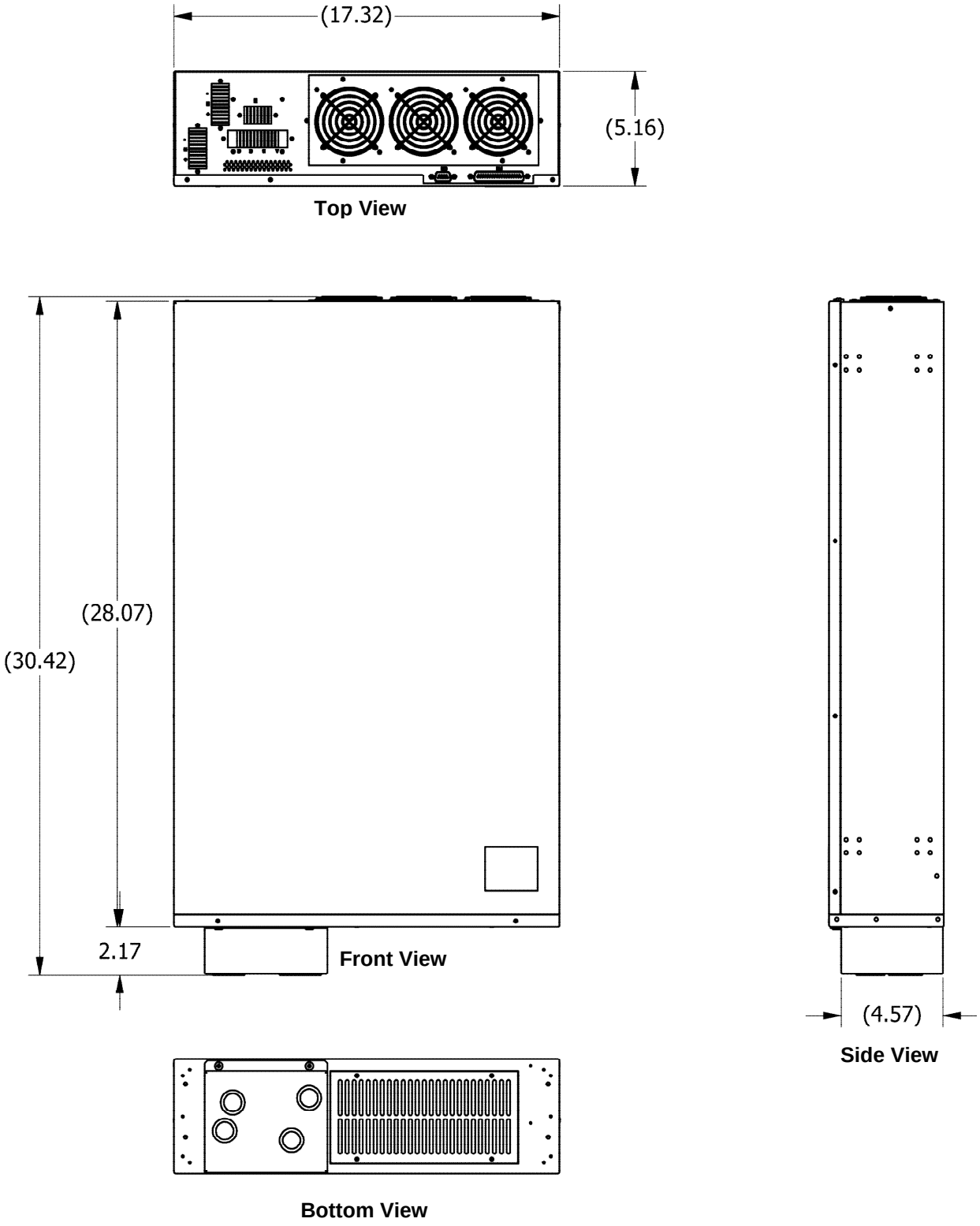


Fig. 4-11 Power Module PureSine (MPSPPMD) Dimensions

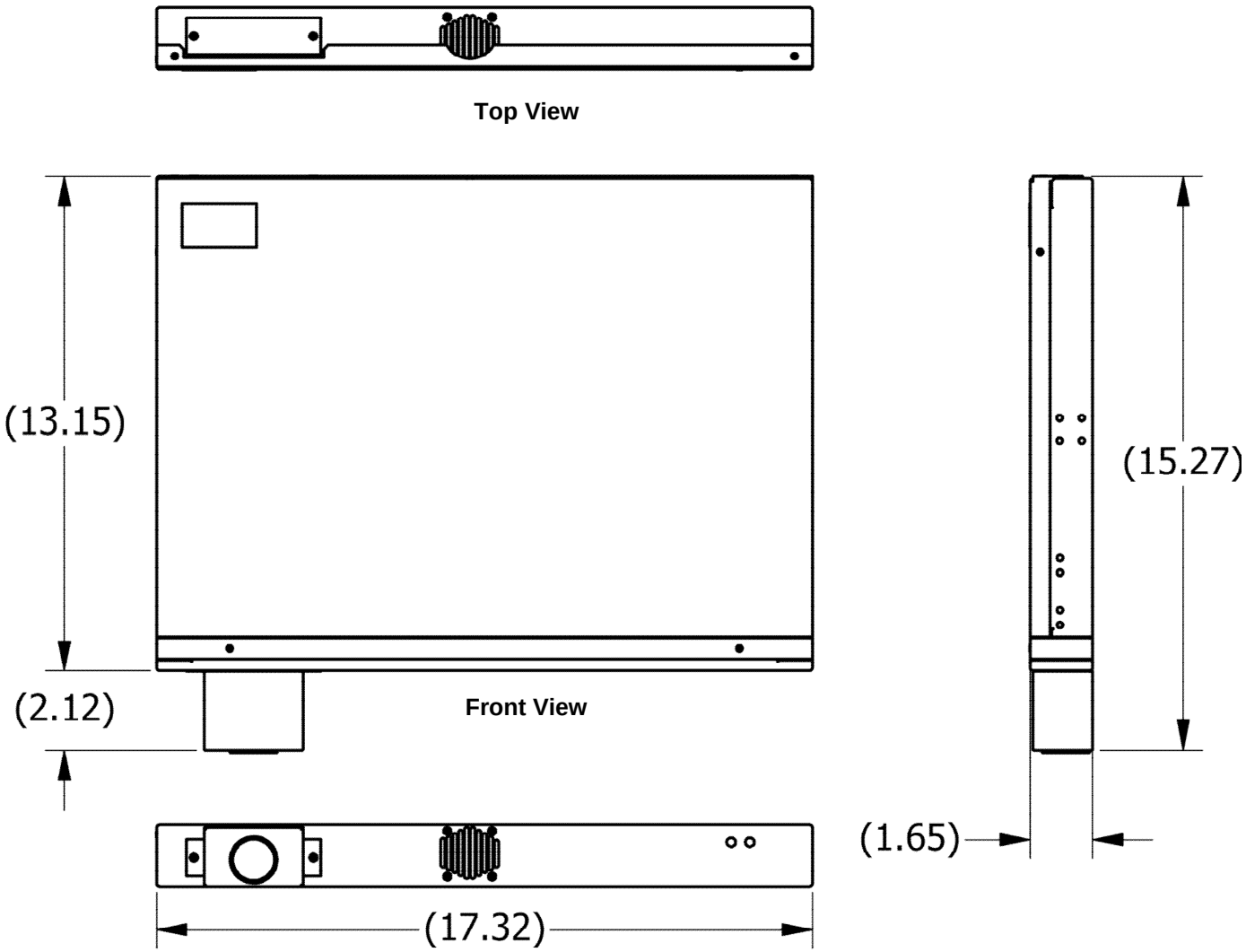


Fig. 4-12 DC Equalizer Module PureSine (MPSPDCD) Dimensions

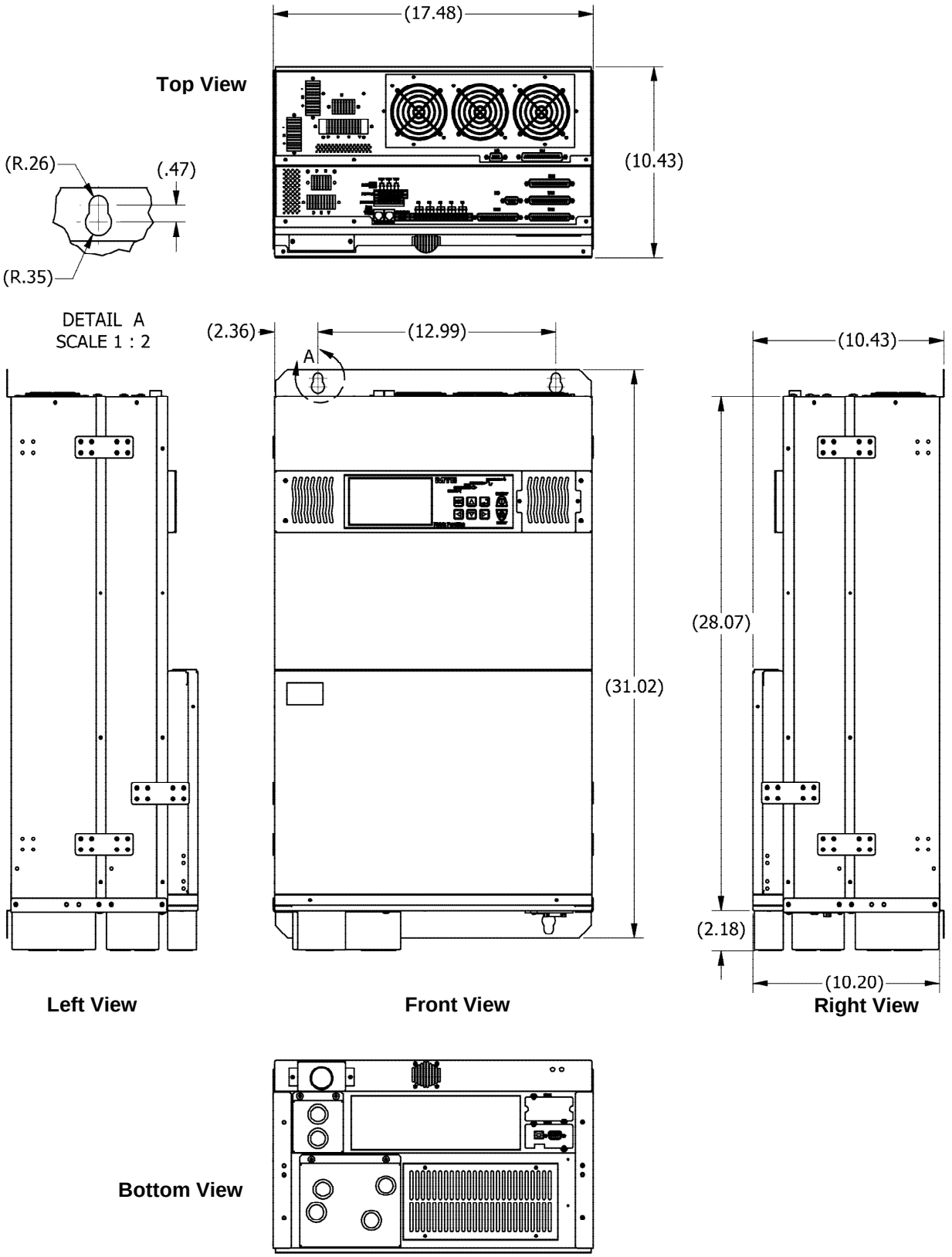


Fig. 4-13 Wall Mount LCD Control Module PureSine (MPSWCCD), DC Equalizer Module PureSine (MPSPDCD) and Power Module PureSine (MPSPPMD) Dimensions

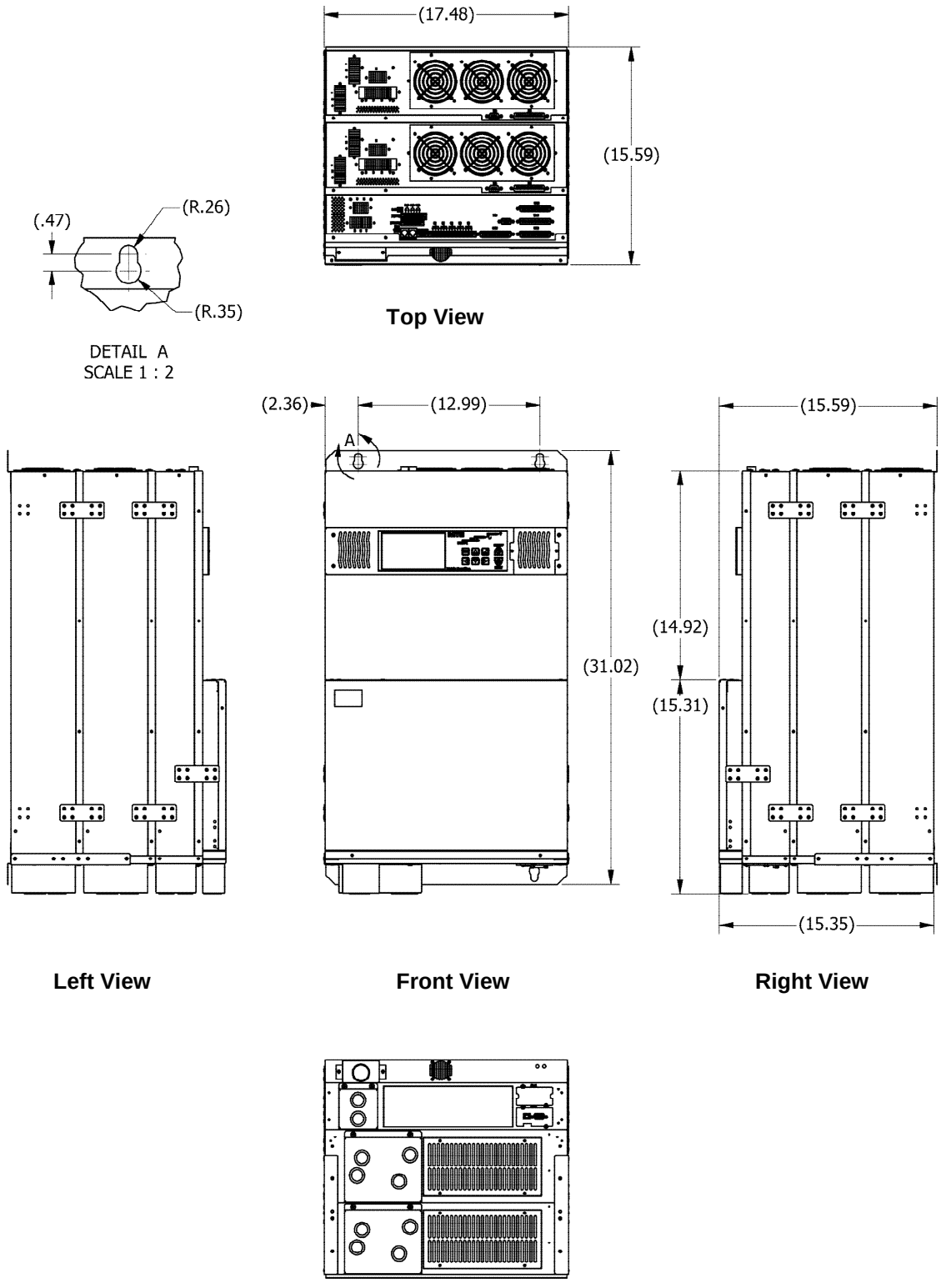


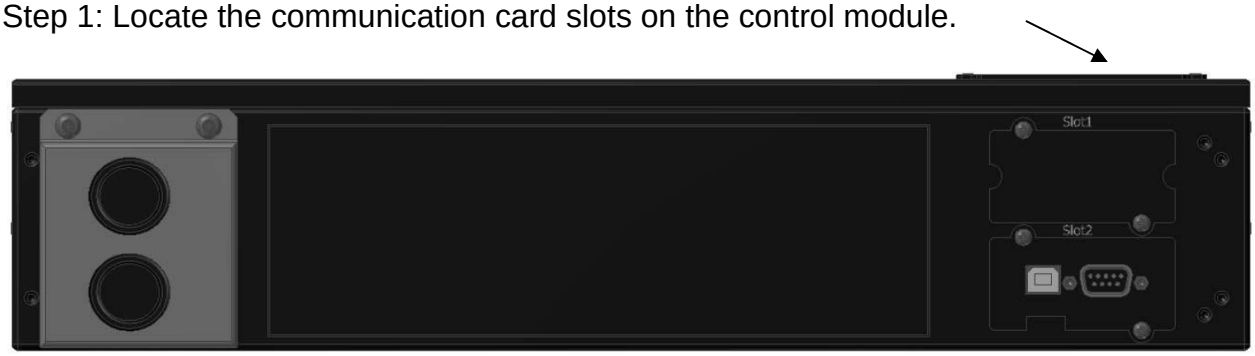
Fig. 4-14 Wall Mount LCD Control Module PureSine (MPSPCMD), DC Equalizer Module PureSine (MPSPDCD) and 2 Power Modules PureSine (MPSPPMD) Dimensions

5. Optional Communication Card

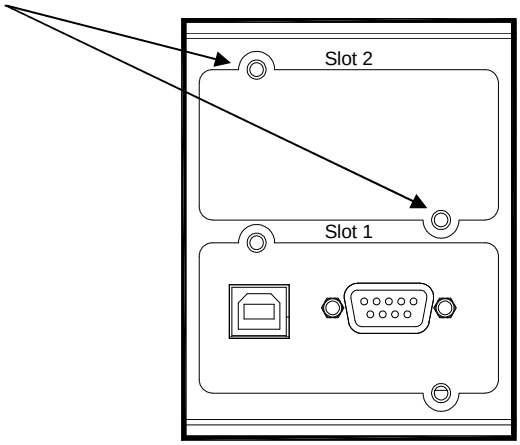
This chapter explains the functionality and installation of the optional RS485/RS422 and Ethernet communication cards.

The installation procedure for the communication card is below:

Step 1: Locate the communication card slots on the control module.



Step 2: Remove the front cover of the communication slot by removing the highlighted screws.



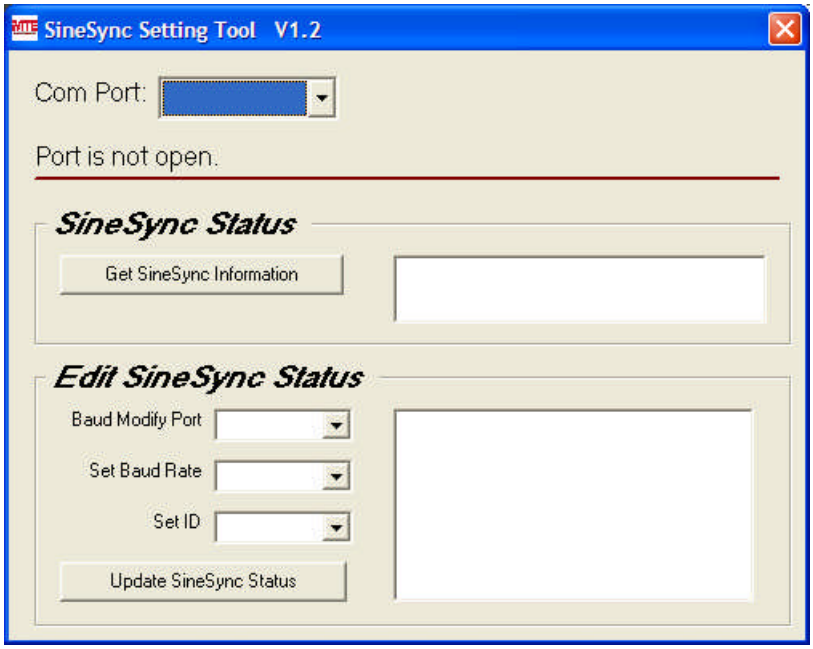
Step 2: Slide communication card into slot and secure with screws.

RS485/422 Communication Card

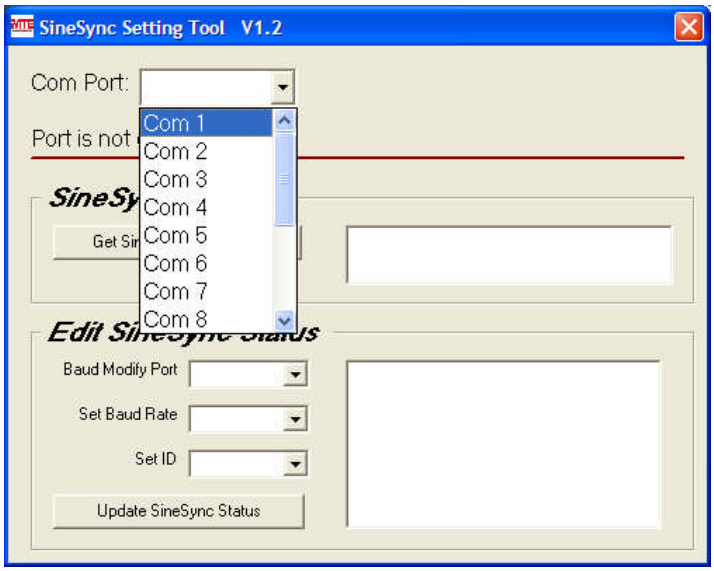
RS422 and RS485 communication interfaces cannot use at the same time. The ID numbers of each Control Module unit have to different, when use RS485 or RS422 for communication linking. User can use software, **SineSync Setting Tool**, to set the ID number.

The setting procedures of **SineSync Setting Tool** as below:

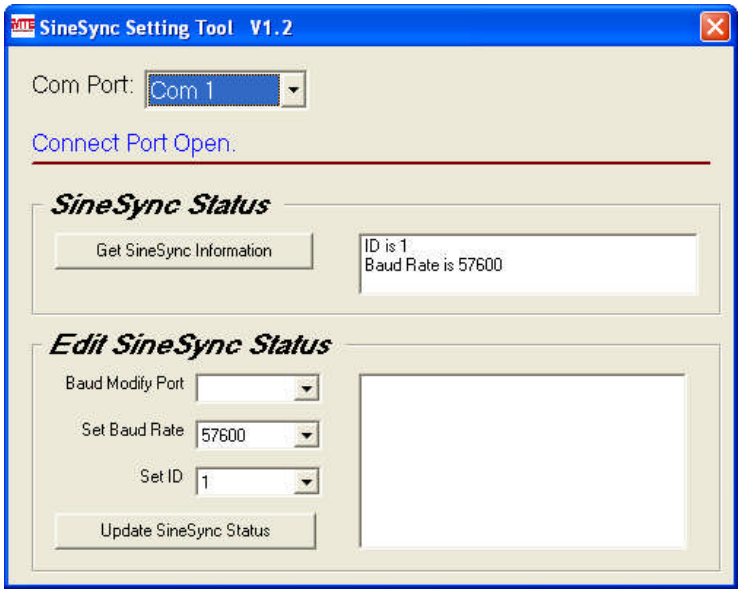
Step1: Please connect the computer through RS232 communication port of the Control Module and then run the **SineSync Setting Tool**.



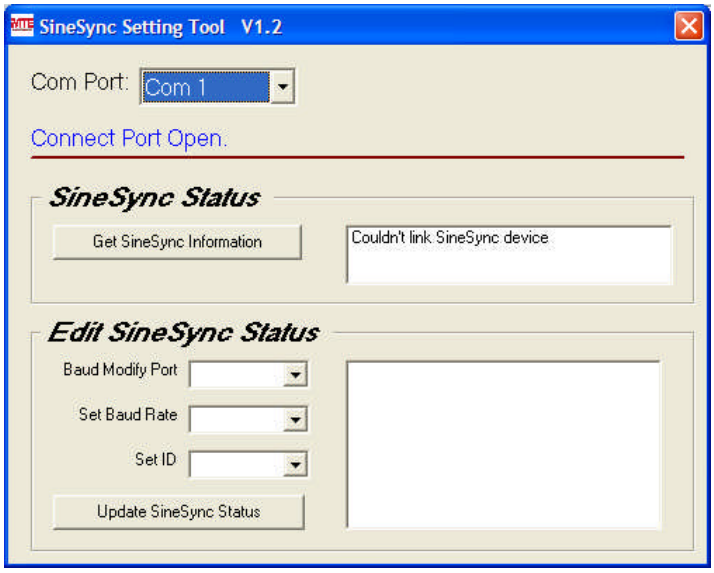
Step 2: Please select the communication port of the computer.



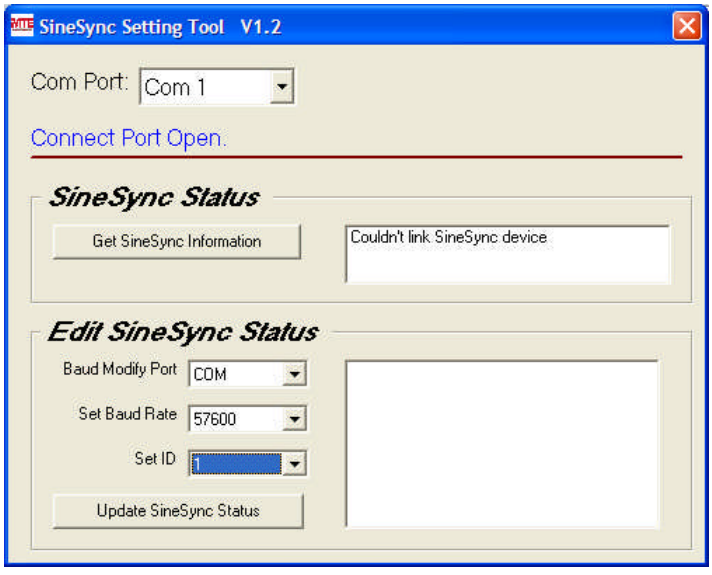
Step 3: If the communication port is set correctly, the computer can read the ID and Baud Rate of communication card.



Step 4: If the communication port is set incorrectly or the communication connection between computer and the Control Module is disconnected, the message "Couldn't link SineSync device" will display.



Step 5: Please press Update SineSync Status to reset the setting, if the message "Couldn't link ESD device" still exist after you verify the communication port and communication connection.

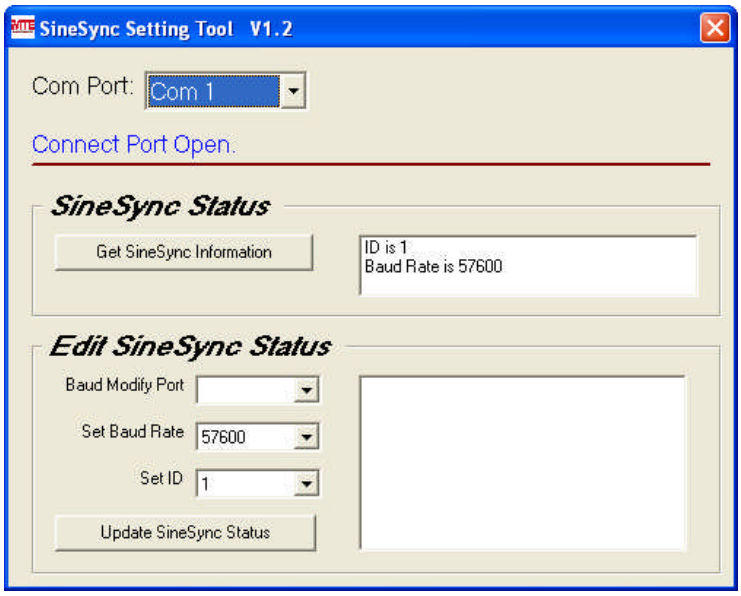


Step 6: User can set the setting for the communication card when communication link is ok. Enter the newest setting and then press Update SineSync Status to update the setting.

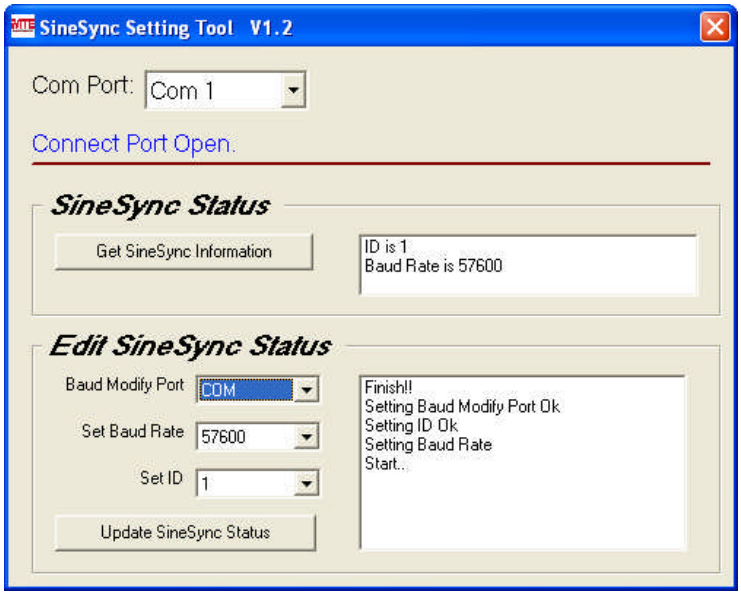
Baud Modify Port: Select which communication interface will be used to modify the Baud Rate through monitoring software ***SincSync***

Set Baud Rate : Set baud rate for communication.

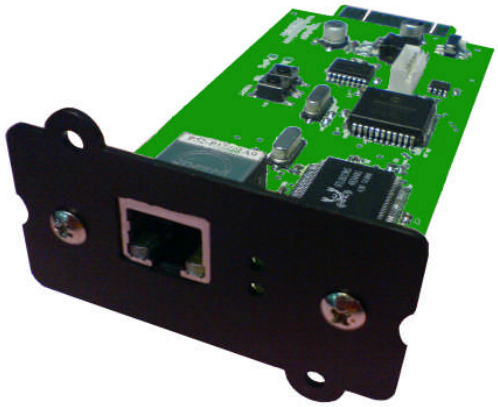
Set ID : ID number for RS485/RS422 communication.



Step 7: When the settings have been updated successfully, you will see the message below.



Ethernet Communication Card

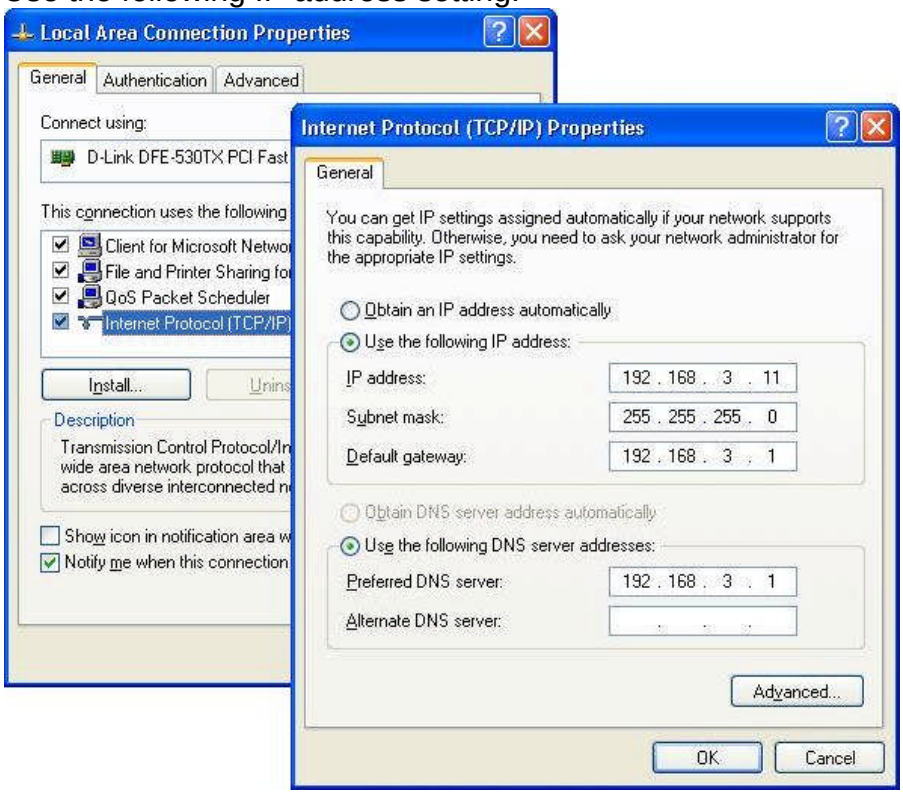


User can use software "**SineSync IP Setting Kit**" to set the IP address and Baud Rate for the Ethernet communication card.

The setting procedures of **SineSync IP Setting Kit** as below:

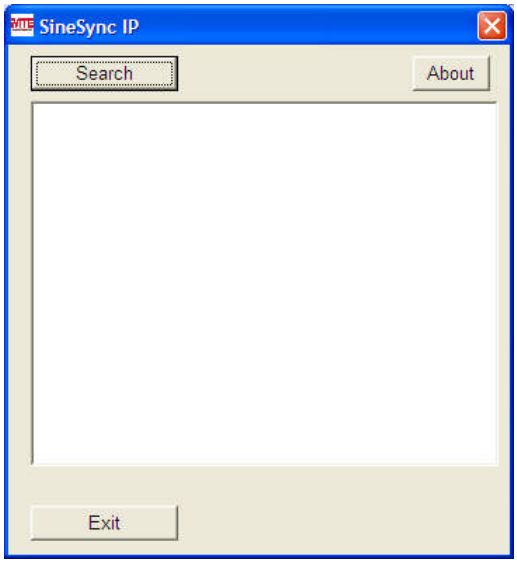
Step 1: Connect the Ethernet card with the computer by the RJ45 cable that is offered with the Ethernet card.

Step 2: Use the following IP address setting.


Local Area Connection Properties
General
Authentication
Advanced
Connect using:
D-Link DFE-530TX PCI Fast
This connection uses the following
Client for Microsoft Networ
File and Printer Sharing fo
QoS Packet Scheduler
Internet Protocol (TCP/IP)
Install...
Description
Transmission Control Protocol/In
wide area network protocol that
across diverse interconnected n
Show icon in notification area w
Notify me when this connection
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 3 . 11
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 3 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 3 . 1
Alternate DNS server:
Advanced...
OK
Cancel

Note: You may not need to define a Default gateway or DNS server. Please consult with your local IT department.

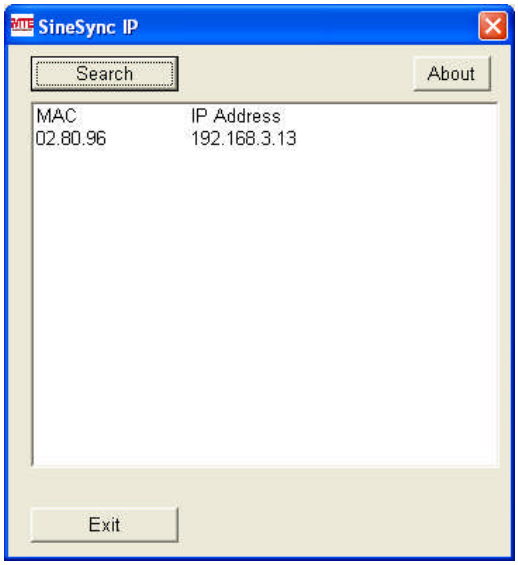
Step 3: Execute **SineSync IP Setting Kit**.



Step 4: Press Search for search the Ethernet card.

MAC：Media Access Control Address of the Ethernet card.

IP Address：Internet Protocol Address of Ethernet Card.



Step 5: Click the desired Ethernet card to enter into the Setting window to set the IP address and Baud Rate for this Ethernet card. Press Update to update the settings.

Note: The Baud Rate setting has to be the same as RS232/USB communication card.